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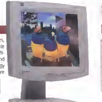

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E² Series

[illegible]	[illegible]	Horizontal [illegible]	Maximum [illegible]	[illegible]	[illegible]
[illegible]	[illegible]/13.2	0.25	1024 x 768	[illegible]	MPR II
[illegible]	15/13.8	0.28	1024 x 768	[illegible]	MPR II
[illegible]	15/13.8	0.25	1280 x 1024	[illegible]	TCO '92
[illegible]	17/16.0	0.25mm	1280 x 1024	[illegible]	MPR II
[illegible]	17/15.8	0.24	1280 x 1024	[illegible]	MPR II
[illegible]	17/16.0	0.23	1280 x 1024	[illegible]	TCO '95
[illegible]	19/18.0	0.26	1600 x 1200	[illegible]	TCO '95

[illegible]

Graphics Series

ViewSonic Model	[illegible] Size	Horizontal Pitch	Maximum Resolution	[illegible]	[illegible]
[illegible]	15/14.0	0.24	1280 x 1024	YES	TCO '99
[illegible]	17/16.0	0.26	1280 x 1024	YES	TCO '92
[illegible]	17/16.0	0.25	1280 x 1024	YES	TCO '92
[illegible]	17/16.0	0.26	1280 x 1024	YES	TCO '92
[illegible]	19/18.0	0.27	1600 x 1200	YES	TCO '95
[illegible]	21/20.0	0.27	1600 x 1200	YES	TCO '92

*Short Depth Monitor **Multi-port USB hub

Professional Series

ViewSonic Model	CRT Size (Viewable)	Horizontal Dot Pitch [illegible]	Maximum Resolution	TCO Low Emissions
[illegible]	17/16.0	0.25AG	1600 x 1200	TCO '99
[illegible]	17/16.0	0.25AG	1600 x 1200	TCO '99
[illegible]	17/16.0	0.25	1800 x 1440	TCO '95
[illegible]	19/18.0	0.25-0.27AG	1600 x 1200	TCO '95
[illegible]	19/18.0	0.25-0.27AG	1600 x 1200	TCO '95
[illegible]	19/18.0	0.25-0.27AG	1792 x 1344	TCO '95
[illegible]	19/18.0	0.25	1600 x 1200	TCO '95
[illegible]	21/20.0	0.27	1800 x 1440	TCO '95
[illegible]	21/20.0	0.27	2048 x 1440	TCO '95
[illegible]	21/20.0	0.27	2048 x 1536	TCO '95
[illegible]	22/20.0	0.25-0.27AG	1792 x 1344	TCO '95

Aperture Grille *Short Depth Monitor **Multi-port USB hub
*[illegible] USB hub and Short Depth #PerfectFlat

MultiMedia Series

ViewSonic Model	CRT Size [illegible]	Horizontal [illegible]	Maximum Resolution	TCO Low [illegible]	[illegible]
[illegible]	15/13.8	0.27	1280 x 1024	TCO '92	2-watt [illegible]
[illegible]	17/16.0	0.27	1280 x 1024	TCO '92	2-watt [illegible]

***Also available in black bezel

ViewPanel Series

ViewSonic Model	[illegible]	[illegible]	Maximum [illegible]	Analog	[illegible]
[illegible]	14.0	WALL MOUNTABLE	1024 x 768	YES	
[illegible]	15.0	WALL MOUNTABLE	1024 x 768	YES	
[illegible]	15.0	[illegible]	1024 x 768	YES	
[illegible]	15.0	WALL MOUNTABLE	1024 x 768	YES	
[illegible]	15.0	PIVOT	1024 x 768	YES	YES
[illegible]	15.0	WALL MOUNTABLE	1024 x 768	YES	
VP151	15.0	[illegible]	1280 x 1024	[illegible]	YES
[illegible]	18.1	[illegible]	1280 x 1024	[illegible]	YES
[illegible]	18.0	PIVOT	1024 x 768	[illegible]	YES
[illegible]	18.1		1280 x 1024	[illegible]	

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The ComputerPAPER

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BC EDITION
JULY 2000

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Working online has become a living example of infoglut. A simple query in a Web search engine returns thousands of hits, only a few of them useful. Email boxes fill with 99 percent junk or otherwise unsolicited mail. While the Internet may be the primary source of today's infoglut, out of Web technology comes some potential solutions as well.

One of the trendy concepts these days is personalization. The first expression of this was when Web sites began offering visitors the opportunity to modify the opening page to suit their specific interests. So using some "my homepage" functions, you could tailor the page to show more sports, only the stock news you care about, and the local weather. Today, you can receive email newsletters customized to suit your interests. But of course, when these are tied to the host's revenue objectives, the more you reveal about the subjects that interest you, the more tightly marketers can focus their pitches on your hot spots.

But there is another side to personalization that isn't specifically tied to an ecommerce agenda. It's the way we sort, compile and store the information as a matter of course these days. This includes bookmarking useful Web sites in our Favourites folder, printing out Web pages to physically store in filing cabinets, or setting up filters on our email so that the mail is automatically sorted into electronic bins.

When information is abundant and commonly available, everyone takes on some of the roles previously assigned to editors and publishers. In the funnelling that takes place in assembling a typical magazine, all possible information about a given subject is narrowed down and refined to perhaps two or three dozen stories and images that make up a single issue. Magazine editors are information gatekeepers, deciding which kinds of content will appeal to the reader and which won't. If they gauge the readership pulse accurately, they are rewarded with a satisfied customer; but if they stray too far and too often from what readers expect, they may wake up one day to realize the magazine has lost touch—and readers.

We editors take pride in our news judgement and our ability to spot a story or trend that will provide unique entertainment or information value. But readers don't have to rely solely on editors' views of the world anymore. Not only can readers make their own judgements about what content is important, they can publish personal volumes that reflect their tastes, priorities and interests. And the Web reduces the costs of both publishing and distribution to just a fraction of what it costs to print and distribute a glossy full colour magazine.

The obvious consequence of this is that the alternative press flourishes on the Web. Anyone with a passion and a point of view can start an online publication. The hate and porn sites that disgust or titillate (depending on your point of view) are a consequence of this reality, but so are the beautifully crafted personal sites devoted to roses, woodworking or bottle collecting.

A less obvious consequence is the shift in the way information in general is now consumed. I attended a Hewlett Packard product roll out recently where Keith Kmetz, an analyst from International Data Corporation talked about the changes in office document distribution. Kmetz said office communication is shifting from a print and distribute model to a distribute and print one. In other words, we're seeing the final days of the centralized printing of multiple copies of a memo or report, which is then distributed to employees. I can't remember the last time anyone distributed a paper memo in our company—it's all email. Even reports are distributed as email attachments to be printed only if the recipient wants hard copy.

Is the distribute and print model relevant beyond the office? In fact, we already see the beginnings of this outside business environments. Suppose you are doing research on flying mammals. With Adobe Acrobat 4 you can surf the Web, going to as many sites as you care to, and saving pages as you jump from site to site. In the process, you're creating an instant volume on flying mammals. Likewise, online music is already there, where you have the ability to produce your own compilations and burn them onto a CD. This isn't printing, but the model is the same: the audience does the compiling.

There are big issues to deal with here, copyright and intellectual property being one. But the gate is now yours to keep.

Interesting times ahead!
David Tanaka

Thank you all!

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The
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VOL [illegible] NO 7 JULY 2000

EDITOR David Tanaka, [illegible]
MANAGING EDITOR Megan [illegible]
PRODUCT REVIEW EDITOR Sean Carruthers, sean_carruthers@tcp.ca
STAFF WRITER [illegible]
EDITORIAL ASSISTANT Sharlene Myers
TCP PRODUCTION DESIGNERS Jason Edmonds, [illegible], [illegible], Colleen [illegible]

COVER DESIGN / FEATURE GRAPHICS Jason Edmonds

Press releases, Fax (604) [illegible]
Email [illegible] Letters: letters@tcp.ca

[illegible]
PUBLISHER [illegible]
CONTROLLER Linda Lovegrove, [illegible]
NATIONAL PROD. MANAGER [illegible]
NATIONAL CIRC. MANAGER Charles Oliver, [illegible]
CIRCULATION MANAGER Samantha Roy, samantha_roy@tcp.ca
B.C. CIRCULATION [illegible]
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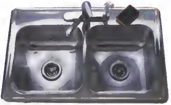

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Web software questions

I read "Web development software shootout" in the June 2000 issue of *The Computer Paper*. Any reason you did not include the popular NetObjects software in your review?

Rick

JS replies: Yes, simply because the Drumbeat 2000 template model so far outclassed what was supposed to be the corner piece of NetObjects Fusion. Likewise in the scripting arena and visual designers ease of use, GoLive, Dreamweaver, Drumbeat and HotMetal all put NetObjects to shame.

With its special interfaces to IBM WebSphere and other databases, NetObjects is doing some interesting but not uniform stuff in contrast with what Drumbeat and GoLive are doing.

In short, NetObjects would have come out so low in the review I decided to wait for the new version 6, which is due at summer's end and promises a major step up.

Two comments on the "Web development software shootout." First, Front Page has never been a part of Office Professional. It's a part of Office Premium. Second, what about Allaire's HomeSite? Don't discharge it! Looks a lot better than weird and expensive Dreamweaver.

Gleb Bylow

JS replies: On the first point, you are right, and we stand corrected. The feature set of Allaire's HomeSite has peaked somewhat in comparison to the template and database and XML stuff being done in the visual editors—that is why we focused on visual editors.

Today's game opponents are tougher to beat. So we're issuing you an unrivaled weapon. The new Viper II graphics card is equipped with 4X AGP power and a transformation and lighting engine for the most realistic images ever. Better yet, Viper II now features S3TC texture compression, which hurls up to 15 million triangles at your monitor every second for the most intense 3D action ever. Make your screen image come alive. Unless, of course, you'd prefer to make them otherwise.

How private? The replies

In our June letters column, a reader recounted a story about the arrest of a person after child pornography was found on his computer by a technician who was servicing it. He wondered what privacy issues this incident raised. We asked readers to respond and received many replies. What follows are some excerpts.—Ed.

As far as I understand it, here in Canada at least, it is a criminal offense to fail to report incidents of child abuse. This is to say then, that when child abuse (child pornography equals child abuse) is discovered by any third party who stumbles across it or who is somehow made aware of it and has no doubts about what the nature of the abuse is, it is incumbent on this person to report it. ... It seems to me, therefore, that a repair company or data recovery company would do well to protect themselves in this area with a zero-tolerance policy where child pornography files stored on hard disks are concerned. ... I, personally, am not terribly anxious that the privacy "rights" of perpetrators be supported when helpless kids are being mercilessly exploited and discarded and their rights to safety and respect are minimized or disregarded.

Maureen Marder

***

Someone who wants to snoop isn't going to worry about ethics. And how effective can the law be? I'd guess about as effective as a stop sign in making drivers stop. When I turn my equipment over to a professional for an upgrade—which seems to happen more and more often—I'd like to feel that private files stay private. Applications like Quicken or QuickBooks provide password protection against unauthorized opening. I'm confident they'll protect my data against a casual visitor to my home or office—but a savvy technician in a well-equipped workshop?

Kevin Golden

***

Suppose that I am a plumber called to fix your kitchen sink. If in the course of my business I see fit to visit your washroom and unexpectedly interrupt your wife in the shower, an embarrassing accident has occurred but not a purposeful invasion of privacy. If, however, I find a child gagged and chained to the drain pipe... thank God.

Rights to privacy do not belong to us for the purpose of hiding what is immoral about ourselves. What is not immoral will survive such accidental embarrassments.

Sandes Ashe

***

It's probably no different than an auto mechanic reading documents in a glove compartment when the car is in for service. In both cases, the technicians should be aware that discretion is an important part of customer relations. They will also remember that they are liable, under civil law, for any damages a customer might suffer. In the case of illegal activities however, customers will not be protected and the authorities should be contacted without delay. That's what happened when pornography was discovered in a computer and the same would be acceptable if an illegal weapon was to be found in a car.

George Dunbar

***

A computer repair technician is a service representative; all service-oriented occupations have a border which they must not cross over! A cable television tech that enters your home

Continued on page 11

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New Media Innovation Centre opens

By Chris Keam

New media in British Columbia got a helping hand from government May 12, with the announcement of the New Media Innovation Centre (NewMIC). The centre, to be established at Harbour Centre in downtown Vancouver is a five year, $29-million initiative to fuel growth in new media technologies, products, and delivery systems

Officials on hand to participate in the announcement included federal Environment Minister David Anderson, B C s Employment and Investment Minister Gordon Wilson, and Graeme Bowbrick, the B C minister responsible for the provincial Information, Science, and Technology Agency

NewMIC is the first project approved for funding under the new Western Economic Partnership Agreement (between the province of B C and the federal government), which will see $40 million spent to stimulate job creation, new technologies, and entrepeneurship between now and March 2002

Federal and provincial governments will each contribute $4 million to NewMIC, with the remainder of the budget to come from industry, revenues generated, and in-kind contributions from the University of B C, Simon Fraser University the University of Victoria, the Technical University of B.C., and the Emily Carr Institute of Art and Design A number of high tech and new media companies are also founding partners in the centre, including IBM, Nortel, Xerox, TRLabs, Electronic Arts, and INSINC! Interactive Netcasting Systems.

NewMIC will be helmed by Alan Winter, the organizations founding president and chief executive officer Previous positions held by Winter include stints as president and CEO of MPR Teltech, president of Comdev Space Group, and president and chief executive officer of SCS Solars.

"The impetus for this project came from the fact that the high tech sector was growing," says Winter "There were a number of companies such as PMC Sierra and Sierra Wireless in the first wave of development, which was infrastructure and applications New media is the next wave "

Winter adds, "Vancouver is very well situated in Western Canada with a thriving film industry, and schools such as Emily Carr and the Vancouver Film School already in place So two years ago a number of people in industry, and particularly the universities said, Could we get a group together to focus on the next wave of development?'"

Winter expects results from NewMIC to be apparent in about a year "We expect over the next year to develop a research program with our industry partners and during that period we expect to be generating intellectual property maybe even spin-off companies. But it will take a number of years for that to work its way through to the next wave of development, in terms of companies growing "

"The high tech sector in British Columbia now employs 50,000 people, has 7 000 businesses in it and annual revenues of $5 billion," said Bowbrick, in an announcement at the opening ceremonies. "Unlike some other high tech areas however, new media's demands for skilled personnel goes beyond scientists There is a need for a wide variety of backgrounds including the liberal arts, creative writing, drafting and graphic design, animation, advertising and marketing Such a diverse and creative workforce will bring about great innovation in this province That's what the New Media Innovation Centre is all about."

British Columbia's multimedia industry currently ranks a distant third among provinces with 13 percent of firms calling B C home. Ontario leads with 40 percent and Quebec is second with 28 percent. ❑

WITH ORDINARY PRINTERS, YOU SEE THE PEOPLE ARE SUNBATHING.
WITH OUR PRINTERS, YOU SEE THE PEOPLE ARE SAND SCULPTURES.

MP3 digital watermark debuts

MINNEAPOLIS, Minn.—Cognicity (http://cognicity.com) has taken the wraps off a user transparent digital watermark system for MP3 files. The AudioKey tMark system has been developed to embed unique watermarks into digital audio files in real time—as the File is being downloaded—the firm said.

Cognicity said the tMark system's unique feature is that the identity of the consumer making a download transaction is embedded into the MP3 track as it is being downloaded.

If the file is uploaded or transferred to other users, the unique watermark clearly identifies the MP3 file's origins, but without preventing the file from playing in the existing wide range of MP3 mobile players or MP3 PC playing software.

The firm said content owners need the transactional watermark solution to fingerprint MP3 downloaded and streamed music so they can identify those who abuse content distribution rights.

To launch the tMark system, Cognicity is offering a free starter kit to qualified customers. The firm said the starter kit will allow content owners and online merchants to experiment with transactional watermarking at no cost or risk to themselves.

—*Newsbytes*

I am geek!

(With apologies to Joe Canadian)

It was inevitable that Molson's popular "I am Canadian" TV ad would inspire people to create their own rants. We discovered the following on a mailing list and traced its origin to one Peter Bennett of Mississauga, Ont.—*Ed*

Hello world!

I don't live with my parents in a room full of cables and assorted boxes, my glasses aren't held together with sticky tape, and I don't live on pizza and Twinkies and potato chips.

I don't know Eric Raymond, Larry Wall, or Linus Torvalds, although I'm sure they are all really good coders.

I drink Jolt Cola, *not* Coke, and I eat sushi, *not* Big Macs.

I believe in open source for everything but proprietary code, and it's spelled PERL, not PEARL or PURL.

I can proudly slap a penguin sticker on my monitor during an all night Quake session.

A Palm Pilot is a computer, a switch is *not* a router, and it's pronounced LIN-ux, not LYE-nux... LIN-UX!

The Internet is bigger than any country, the first defence against government oppression, and the *best* damned thing that ever happened to the human race!

My name is h4X0r000d
And I am a Geek!

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It's true. The couple enjoying the sand is actually made from it. As are their clothes, glasses and book. Even the blanket they're lying on. It's all sand. Meticulously sculpted, painted and photographed to fool the eye. So when the artists who created this difficult illusion wanted to reproduce it for a brochure, there was only one printer they could trust with the job. An Epson. As you can see here, it captured not just the vibrant colour of the setting but also the incredible detail in the sculptures. And turned what could have been a nightmare of a project into a day at the beach.

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Letters
Continued from page 8

to install co-ax has no right to open a woman's dresser to seek out lingerie, nor does he have the right to preview magazines or inspect book titles on a shelf, enter a refrigerator or open closet doors where the co-ax cable would not run.

Alex Steiger

Make my art permanent

Your editorial "Art and Technology" (see Letter from the editor, May 2000 issue) touched on a topic that is finally getting some attention, the issue of permanence in inkjet printing. As a photographer who has spent thousands of hours in a darkroom breathing in fumes from the chemistry, I was quite happy to make the switch to Photoshop and my Epson printer. However for this approach to be viable for photographers producing personal artwork, we need archival quality. It was heartening to see at least two exhibitors at a recent new media trade show demonstrating archival inks and papers.

I hope *TCP* will cover the state of the archival art in a future issue. I think there is a lot of interest in this area.

Gerard Gotzman ☐

WHAT'S NEW

Optra printers for small business

Lexmark Canada Inc. rolled out several new Optra series printers aimed at claiming a greater stake in the growing small- and medium-sized business market in Canada.

Some 78 percent of Canada's one million employers have fewer than five employees, and 97 percent say they have fewer than [illegible] according to Lexmark.

Andrew Kiss, product manager for the business printer division of the Richmond Hill, Ont.-based Lexmark says these businesses are looking for printers that are easy and reliable.

For this market, Lexmark has introduced its Optra E312, which replaces Lexmark's earlier Optra E310 printer. Priced at $599, the E312 is a 10 page per minute (ppm) monochrome laser printer that comes standard with both USB and PostScript emulation. It is cross-platform compatible and comes with 4 MB of memory, which is upgradeable to 68 MB.

The Optra M412 is a complement to Lexmark's current mid-range M line of printers. Priced at $1,199, the M412 offers 17 ppm monochrome laser printing, cross-platform compatibility USB and PostScript support and has a duty cycle of [illegible] pages.

For the corporate market, Lexmark introduced its Optra T614 and Optra C710 network laser printers. The T614 offers 25 ppm monochrome printing speeds, parallel and internal ports and Ethernet 10/100BaseT connectivity. It is priced at $[illegible].

The Optra C710 is a colour laser printer capable of producing images up to 1 200x1 200 dpi resolution with speeds of 16 ppm monochrome and 4 ppm colour. It is priced at under $3 000

—[illegible]

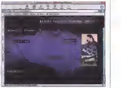
Qbe tablet begins shipping

When Access Technologies previewed its Qbe (pronounced cube) Cirrus computing tablet at last fall's Comdex trade show it won a "Best of Comdex" award and lots of admiration. The unit is now finally on sale. While plans for Canadian availability are still unclear you can always order one directly from the Santa Ana Calif company (Tel 888-818-0055, http://www.qbnet.com) if you can shoulder the US$4 745 price tag

For that you get a 2 7 kg (6 lb) computer that measures 25 5x35 5x4 cm (10x14x1 6 in) with a 13 3 inch active-matrix touch-screen display, a 12 GB hard drive 128 MB of RAM and a 400 MHz Pentium II processor. Data is input either by voice or with a stylus and is processed by handwriting-recognition or voice-recognition software. A built-in digital camera allows video and still image capture. And if you really need to type the included PS/2 port will accept a standard keyboard

The company also announced a new model the Qbe Stratus, which will weigh a little over 1 kg. (3 lb.) and will measure 28x23x3.8 cm (11x9x1 5 in) It will be available in the fall, and is expected to cost around US$1 500

—*David Tanaka*



Town wired for Web end WAP

A village near Cologne in Germany says it is the first to be fully Web and WAP-enabled (Wireless Application Protocol enabled) According to wireless application company Yourwap.com, the village of Untereschbach can now be accessed as Untereschbach.com (http://www.untereschbach.com) with information about local business services, products and events available to every resident and visitor via mobile phone and the Internet. The company said Untereschbach.com is a pilot project to show how WAP technology can be used even in small towns to enhance retail business The goal of the project is to provide consumers with location- and time-specific information about businesses while they are on the move, and to prove that wireless commerce can actually help cement long standing relationships with local businesses

—*Newsbytes*

Diminutive digicam stores 20 pics

Details are still sketchy about a new digital camera from Xtreme Peripheral Inc. (Tel. 818-987 5650) What we do know is that it will cost less than $150, hold 20 images use a USB connection to download images and is about the size of a Bic lighter We'll be taking a closer look at this when product samples become available.

—*David Tanaka*

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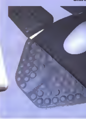
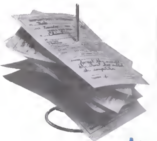


From Body Moulded Comfort Inc. (Tel 800-838-5433 http://www.bodymouldedcomfort.com) in Brampton Ont. comes a line of very comfortable mouse and keyboard pads being sold under the brand names Chiro Keyboard Pad and Chiro Mouse Pad. The company says its products have been endorsed by the Canadian Chiropractic Association and Canadian Physiotherapy Association

The pads are made using an impact absorbing foam product called "visco-elastic." We're not sure of the physics involved but can attest to the fact that they are indeed very comfortable They have a rough industrial look to them and the foam initially gives off a faint odor of rubber some might find unpleasant. But we think they are worth the $19 95 suggested retail price.

—*David Tanaka*



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The ergonomics of IT

Problems associated with long spells at the computer remain a major health hazard despite years of expert warnings

By Ross MacDonald

A visit to just about any computer retailer shows evidence that ergonomic issues have become a major part of product design. Keyboards bend in all manner of directions, mice undulate in infinite variety while monitors and LCD panels tout the latest in eye-massaging pixel production and anti-glare coatings. Add to that the racks of copy holders, mouse arenas, wrist rests and monitor stands and we begin to suspect there might be something to this thing called ergonomics—particularly in relation to our computers—and that it's an issue we should more seriously consider while tapping and clicking away.

Ergonomics, in simplest terms, is the study of the relationship between the worker and the workplace. It is the science of fitting the workplace to the worker, which has become a specialized field as workers are exposed to many situations that can potentially lead to injury.

What do we know about ergonomics?

Meera Manahan manages the Human Factors Lab, an internal consulting firm operated by Compaq Computer Corp. to test the efficiency, comfort and usability of both hardware and software before it is released onto the market.

"There are various ergonomic consortia that are a part of academic institutions, like the VDT Health Foundation at Johns Hopkins University and the Office Ergonomics Research Committee, which a number of companies including Compaq support. These organizations assess the factors leading to disorders and we, along with the other supporting companies, rely on their research when designing our products."

But Manahan notes that despite many years of research into ergonomics and the various associated disorders, their causes and sources have yet to be positively determined. "There are several factors and combinations of factors that contribute to things like repetitive stress disorders for different individuals, so I think it would be incorrect to say, at this point, that we know the exact causes."

Work can hurt ya

While research may not have been able to pinpoint the exact causes, we are all familiar with the high risk situations and the consequences of working in them.

"Fatigue of the musculature is of particular concern because it can lead to joint immobility or improper joint movement," says Jody Anderson, a New York trained chiropractor and vice-president of research and ergonomics for Microsphere, a maker of ergonomic workstations. "Ultimately that can lead to certain pathologies or conditions, one of the most prevalent being the repetitive stress injuries [RSIs] like carpal tunnel syndrome in the wrist area."

Wrist problems are prevalent, largely because of the relationship between the body and the keyboard. The head, neck and shoulders can also be affected, which manifest as either simple discomfort or unexplained headaches.

"Problems in the head, neck and shoulder area result from a combination of factors," Anderson explains, "the most influential of which are improper seating position and an improper positioning of the computer screen."

Peter Goyert is an ergonomist at the Workers Compensation Board, a position rooted in his training as a physiotherapist. He feels that ergonomics considerations have become more salient because computers are now so fast and can do so much, people tend to work at them for longer periods of time while sitting in a static position.

"People aren't doing as many different tasks as they once were," he says. "Like with a typewriter you used to have to roll the paper through, set up carbon paper, type the letter... that sort of thing, whereas with a computer you're basically sitting all day looking at the screen and doing a lot of high repetition tasks."

Goyert says the injuries these days include tendinitis, carpal tunnel syndrome, bursitis and shoulder problems. In short, he says "a wide variety of what we call activity related soft tissue disorders [ASTD for short]—or muscular skeletal disorders, or work-related muscular skeletal disorders, or repetitive strain injuries, or symptive traumas, or repetitive motion injuries, or overuse syndrome—there's all sorts of names for these problems, but they essentially address the same things."

Repetition, awkward posture, static loading and forceful exertion are the risk factors associated with those problems, says Goyert. "It doesn't really matter whether you're sitting at a computer or whether you're turning boards on a grading table or you're a cashier checking out groceries, the risk factors are essentially the same."

These injuries don't just appear overnight. There are warning signs and symptoms including aches and pains, tingling, and headaches. Goyert says people tend to ignore these, which can lead to problems progressing to the point of becoming a genuine incapacity. "You want to watch out for any signs and symptoms," he says. "Maybe a pain somewhere or swelling in the hands, or something that you'd want to get checked out to try and avoid the development of a chronic problem."

In the United States, the Occupational Safety and Health Administration (OSHA) has addressed the issue of ergonomics by passing new workplace regulations. "It's such a serious issue," Anderson says, "that corporations are now mandated to increase their standard of workstations to comply with new ergonomic rules and regulations." A company can now be held liable for an injury and potentially lose its insurance if it does not upgrade the workplace environment to comply with the OSHA requirements.

The problem, however, is that no single standard has been determined. A further problem is that nothing like the OSHA initiative has yet been undertaken in Canada. "Trends are moving toward such regulation in this country," says Anderson, "but nothing has been done at this point."

This may seem somewhat curious because, according to the 1998 B.C. Workers' Compensation Board annual report, of 3,319,300 claims in that province 32,105 were from strains resulting from repetitive stress and 71,760 claims were specifically classified as ergonomic injuries. Add the fact that over 128 million computers were in use in North America in 1999—compounded by an annual market growth rate of 28 percent—and you don't need a calculator to add up the vast potential for both injury and the subsequent costs.

But it doesn't have to hurt ya

One of the most frustrating aspects of the whole issue as far as Anderson is concerned is that disorders related to poor ergonomics represent the largest group of preventable job-related injuries because there are so many simple ways to accommodate safe and comfortable computing.

> If you're sitting for eight hours a day doing data entry on a computer, you just can't expect not to have any problems. So, what you have to do is get some rest from that constant repetition.
>
> *—Peter Goyert, WCB*

Like Anderson, Goyert stresses the layout of the computer workstation as a prime consideration in avoiding ergonomic problems. "You want to make sure your workstation is adjusted properly—have your forearms horizontal to your keyboard, make sure your wrists are straight and not bent upward, making sure the top of your screen is level with your eyes. As well, your lower back should be supported by the chair and your feet supported by the floor or a footrest. You also want to make sure you

Continued on page 22

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Yamaha YST M830 Speakers w/Subwoofer
Samsung 780S 17" .27mm DP NI SVGA Monitor
ATX Mid Tower Case with CSA 300W Power Supply
107-keys Windows 98 Keyboard,PS/2 Mouse
2 Year Parts & Service Warranty

1GHz THE ATHLON HAS LANDED

Athlon K7-700MHz $1,770
Athlon K7-750MHz $1,820
Athlon K7-800MHz $1,930
Athlon K7-850MHz $2,065
Athlon K7-900MHz $2,360
Athlon K7-950MHz $2,530

Pentium III ~ MediaMax

Intel Pentium II/III (Coppermine) Processor
Pentium III 440BX AGP/PCI/ISA Main Board
Internal L2 Cache
64MB 168 Pin SDRAM (PC100MHz)
1.44MB Floppy Drive
10GB Ultra DMA-66 IDE Hard Drive
Ultra DMA33 Cont. w/2x16550 Serial,
1xBi-Directional Parallel,2xUSB Port
AGP nVidia TNT Vanta 3D Card 16MB SDRAM
Creative Labs Sound Blaster Ensoniq Card
50x Speed UDMA CD-ROM Speakers
15" Non-Int Low Rad. SVGA Monitor PnP
ATX Mid Tower Case with CSA Power Supply
107-keys Windows 98 Keyboard, PS/2 Mouse
2 Year Parts & Service Warranty

PIII 400MHz 512KB L2 .. $1,035
PIII 500MHz 256KB L2 .. $1,080
PIII 550MHz 256KB L2 .. $1,105
PIII 650MHz 256KB L2 .. $1,160

Pentium III ~ MediaMax Pro

Asus CUBX AGP/PCI/ISA ATX Main Board
Internal L2 Cache
64MB 168 Pin SDRAM (PC100MHz)
1.44MB Floppy Drive
15GB Ultra DMA-66 IDE Hard Drive
Ultra DMA66 Cont. w/2x16550 Serial
1xBi-Directional Parallel,2xUSB Port
AGP nVidia TNT2 M64 3D Card with 32MB
Creative Labs Sound Blaster Live! Value Card
50x Speed UDMA CD-ROM
MLI 460 Sub-Woofer Speaker System
Impression 17" .27mmDP SVGA Monitor
ATX Mid Tower Case with CSA Power Supply
107-keys Windows 98 Keyboard,PS/2 Mouse
2 Year Parts & Service Warranty

PIII 600MHz 256KB L2 .$1,380
PIII 650MHz 256KB L2 .$1,435
PIII 700MHz 256KB L2 .$1,485
PIII 750MHz 256KB L2 .$1,660
PIII 800MHz 256KB L2 .$1,775

Acer Storage Pack

7 Discs-74min 8x 74min CD-Recordable
3 Discs-74min 4x CD-ReWritable
$15

IDE Hard Drive Special !!

UDMA 66 IDE
6.4GB $118
10GB $130
15GB $168
HARD DRIVE
17GB $183

D-Link DFE-905

4 Port 10/100 Hub,
2x UTP 20 ft. Cable
& 2x DFE-530TX
$155.00

Power Station

PC Partner VIA Apollo Pro 133 AGP Main Board
64MB 168 Pin High Performance SDRAM (PC 100)
1.44MB Floppy Drive
10GB Ultra DMA-66 IDE Hard Drive
Ultra DMA66 Cont. w/2x16550 Serial
1xBi-Directional Parallel, 2xUSB Port
AGP Diamond Speedstar A90 Savage 4 16MB
On Board AC-97 Sound Card
50x Speed UDMA CD-ROM,Speakers
15" Non-Int Low Rad. SVGA Monitor PnP
ATX Mid-Tower Case with CSA Power Supply
107 keys Windows 98 Keyboard,PS/2 Mouse
1 Year Parts & Service Warranty

CELERON
466MHz w/128KB L2 .... $ 865
500MHz w/128KB L2 .... $ 880
533MHz w/128KB L2 .... $ 890
566MHz w/128KB L2 .... $ 935

Celeron ~ All-in-One

PC Partner i810 Micro ATX Main Board
64MB 168 Pin High Performance SDRAM
1.44MB Floppy Drive
10GB Ultra DMA-66 IDE Hard Drive
1xBi-Directional Parallel,2xUSB & 2xSerial Port
On Board 64 Bit 3D Graphics Accelerator
On Board 3D Sound Pro Wavetable Card
56KBps v.90 Modem (or DLink DFE-530TX 10/100 LAN)
50x Speed UDMA CD-ROM,Speakers
15" Non-Int Low Rad. SVGA Monitor PnP
ATX Mid-Tower Case/w CSA Power Supply
107 keys Win98 Keyboard,PS/2 Mouse
1 Year Parts & Service Warranty

CELERON
466MHz w/128KB L2 .... $ 825
500MHz w/128KB L2 .... $ 840
533MHz w/128KB L2 .... $ 850
566MHz w/128KB L2 .... $ 895

AMD K7 Performer

Impression K7 Athlon VIA 133 Main Board
128MB 168 Pin High Performance SDRAM (PC100MHz)
1.44MB Floppy Drive
18GB Ultra DMA-66 IDE Hard Drive
Ultra DMA-66 IDE Controller
2 x 16550 Serial, 1 Parallel & 2xUSB Port
AGP TNT Vanta 3D Card w/16MB
On Board AC-97 2.0 Audio Sound Card
50x Speed UDMA CD-ROM,Speakers
15" Non Int SVGA Monitor .28mm dp PnP
ATX Mid-Tower Case with CSA Power Supply
107-keys Win98 Keyboard, PS/2 Mouse
1 Year Parts & Service Warranty

AMD Athlon K-7
K7 - 550MHz $1,135
K7 - 650MHz $1,195
K7 - 700MHz $1,230

Video Graphics Adapters

ATI 3D Charger AGP 4MB/8MB	$[illegible]
ATI All-in Wonder 128 AGP Card 16MB/32MB	$212/280
ATI Xpert98/Xpert99 AGP Card 8MB	$52/83
ATI Rage 128 AGP Card 16MB/Xpert 2000 AGP 32MB	$105/114
ATI Rage Fury/Fury Pro (VIVO) AGP 32MB	$155/184
ATI Rage Fury Maxx 64/All-in-Wonder 128 Pro 32MB	$258/358
ATI TV Wonder Tuner Card (NTSC)	$90.00
ASUS V6600 nVIDIA GeForce 256 Pure/Deluxe 32MB	$280/318
ASUS V6800 nVIDIA GeForce 256 Pure/Deluxe DDR	$308/355
ASUS V6800 nVIDIA GeForce 256 64MB DDR Pure	$428.00
ASUS V7700 nVIDIA GeForce 2 GTS 32MB DDR Pure	$480.00
Diamond Speedstar A90 Savage 4 AGP 16MB	$59.00
Guillemot Maxi Gamer Xentor AGP 32MB($30 rebate)	$300.00
Guillemot Maxi Gamer 3D Prophet 32MB DDR	$[illegible]
Matrox Millennium G400 AGP 16/32MB SGRAM	$140/188
Matrox Millennium G400 AGP 16/32MB Dual Display	$152/238
nVIDIA TNT Vanta 3D AGP 16MB	$74.00
nVIDIA TNT2 M64 32MB/TNT2 Ultra 32MB TV Out	$[illegible]

Monitors

ADI [illegible] 17" .26mm/.24mmDP	$[illegible]
Mag 786FD 17" NI (1280x1024 .24mmDP)FD	$[illegible]
Mag 800V 19" NI LR (1600x1200 .26mmDP)	$[illegible]
NEC A500/A700 15"/17" .28mmDP Dot Trio	$222/310
NEC FE700/700M 17" .25mmDP Flat Display	$[illegible]
Panasonic E70i 17" (1280x1024 .27mmDP)	$328.00
Panasonic S50/S70 15"/17" (1280x1024 .27mmDP)	$210/418
Panasonic [illegible] 19" FD (1600x1200 .25mmDP)	$[illegible]
Panasonic S110 21" (1600x1440 .25mmDP)	$1100.00
Proview 17" NI/LR(1280x1024,.27mmDP)	$[illegible]
Proview 17" NI/LR(1280x1024,.25mmDP)	$[illegible]
Proview 19" NI/LR(1600x1200 .26mmDP)	$410.00
Sony E100 15" NI/LR(1280x1024,.24mmDP) FD	$315.00
Sony E200 17" NI/LR(1280x1024 .24mmDP) FD	$[illegible]
Sony E400 19" NI/LR (1600x1440 .24mmDP)FD	$705.00
Sony E500 21" NI/LR(2048x1536, .24mmDP) FD	$1535.00
Sony G200 17" NI/LR(1600x1200 .24mmDP) FD	$810.00
Samsung 580S 15" NI/LR(1024x768, .28mmDP)	$[illegible]
Samsung 950P 19" NI/LR(1600x1200 .20mmDP)	$530.00
Sceptre 15" NI/LR(1024x768, .28mmDP)	$181.00

HD/FD Controllers

[illegible] IDE HDP 3 Controller with I/O UART 16550	$[illegible]
Adaptec 1505/2906 SCSI CD-ROM Controller	$[illegible]
Adaptec 2910/2930U PCI SCSI Controller	$115/138
Adaptec 29160/39160 PCI Ultra 160 SCSI	$[illegible]
Adaptec AAA-UDMA/66 RAID Card Kit	$[illegible]
Adaptec AAA-131U2 RAID SCSI Card	$540.00
Promise Ultra66 Fastrak 66 PCI Controller	$[illegible]

Keyboards & Cases

Fujitsu 4725/4925 Enhanced 104 Keys	$[illegible]
Procomp Windows 98/Internet Keyboard	$10/22
Logitech Deluxe/Internet Keyboard	$20/52
Logitech Cordless iTouch Keyboard	$74.00
Logitech Cordless iTouch/Desktop Pro Keyboard	$128/180
Microsoft Natural Elite/Internet Keyboard	$[illegible]
17"/19" ATX Mid Size Tower w/ CSA Power Supply	$[illegible]
18" ATX Tower with 250W CSA Power Supply	$[illegible]
15"/19" Mid Size Tower with CSA Power Supply	$[illegible]

Drives & Tape Backup

[illegible] 5.25" 1.44MB 3.5" Floppy Drive	$[illegible]
Panasonic LS-120 120MB Floppy Drive(2x Speed)	$[illegible]
20GB/30GB/40GB/60GB 5400RPM HDD	$[illegible]
15GB/20GB/30GB/40GB 7200RPM HDD	$[illegible]
HP Colorado 8GB Int/Ext Backup Drive (no media)	$250/386
HP Colorado 14GB Int/Ext Backup Drive (no media)	$335/405
HP Colorado 20GB Int/Ext Travan Drive(no media)	$[illegible]/445
Seagate 4GB TR-4 Int IDE/SCSI Tape Backup Drive	$[illegible]

Motherboards

Intel L440GX+ Pentium III 1 Server Board	$[illegible]
Abit BF6/BE6-II 440BX Pentium III Board	$[illegible]
Abit BP6 440BX Dual Socket 370 Board (Ultra66)	$218.00
Abit VT6 VIA Apollo Pro 133 Pentium III Board w/Sound	$[illegible]
Abit KA7 100 KX133 A1A-100 Athlon Board	$[illegible]
ASUS P5A-B 100MHz AGP Socket 7 512KB L2	$122.00
ASUS P3B-F/CUBX 440BX Pentium III/III Board	$[illegible]
ASUS P2B-DS 440BX Dual CPU Ultra2SCSI Board	$[illegible]
ASUS P3C-E 133MHz RAMBUS Pentium III Board	$[illegible]
ASUS P3V4X/CUV4X VIA Apollo Pro 133 Board	$155/175
ASUS K7M/K7V Slot A Athlon Board	$[illegible]
Tyan S1834D-I VIA KX133 Dual Pentium III Board	$[illegible]

MultiMedia

Aureal Vortex 2 SuperQuad A3D 2.0 Sound Card	$[illegible]
Creative Labs Sound Blaster Ensoniq PCI/PC 128	$[illegible]
Creative Labs Sound Blaster Live MP3+/X-Gamer	$133.00
Creative Labs Sound Blaster Live! Platinum/Live Value	$[illegible]
Aztech 50X/Creative Labs 52X IDE CD-ROM Drive	$[illegible]
Hewlett Packard 8250i 4x4x24 IDE CDRW	$[illegible]
Hewlett Packard 9710e Int/Ext SCSI CDRW	$[illegible]
Panasonic 4x4x32 Int IDE CDRW	$270.00
Plextor 8x4x32/12x4x32 IDE/SCSI CDRW	$[illegible]
Toshiba 10X SCSI CD-ROM Drive	$125.00
Yamaha 4x2x6 [illegible] IDE SCSI CDRW	$[illegible]

Modems & Mice

Diamond SupraMax 56K v.90 PCI Voice	$47.00
US Robotics 56K v.90 Int/Ext Fax Modem	$[illegible]
US Robotics 56K v.90 USB Pro Ext Modem	$205.00
Zoltrix 56K v.90 External Fax Modem	$60.00
Genius NetMouse with Magic-Button	$12.00
Logitech Mouseman/FirstMouse+ OEM	$15.00
Logitech Cordless Printer Mouse	$52.00
Logitech TrackMan Marble Wheel/Marble FX	$[illegible]
Microsoft Basic Mouse/Cordless Wheel Mouse	$[illegible]
Microsoft Trackball Mouse/IntelliMouse	$[illegible]
Microsoft IntelliMouse With PS/2	$28.00
Microsoft IntelliMouse Optical Trackball/Explorer	$[illegible]
Microsoft Compatible Mouse	$5.50

Printers

Canon BJC-[illegible] ($20 rebate)	$[illegible]
Canon BJC-5100 Color Inkjet	$119.00
Canon BJC-3000/5100 Inkjet ($30 rebate)	$228/258
[illegible] 1030 Laser 600dpi 10ppm	$300.00
Epson Stylus 440/870	$113/132
Epson 740i Inkjet for iMac(US$50 rebate)	$255.00
Epson Stylus 760 Inkjet(US$30 rebate)	$228.00
Epson Stylus 670/875DC Inkjet 1440dpi	$[illegible]
Epson Stylus 900/900N Color Inkjet 1440dpi	$[illegible]
HP 610C/640C Deskjet Color Printer	$[illegible]
HP 830C/880C Deskjet Color Printer	$[illegible]
HP 895Cxi/970Cxi Deskjet Color Printer	$[illegible]
HP P1000/P1100 PhotoSmart Color Printer	$[illegible]
HP 1220C/XI/2000C Deskjet Color Printer	$[illegible]
HP 2500C/2500CM Professional Printer	$1395/2095
HP 1100/1100A Laserjet 600 dpi 8 ppm	$[illegible]
HP 2100/2100M Laserjet 1200 dpi 10 ppm	$[illegible]

COMPAQ
Authorized Reseller
HEWLETT PACKARD Authorized Retailer
Business Partner
Intel Processor Dealer
Cisco Systems
Gateway
3Com
SONY

MicroConcept

102 - 1245 West Broadway
Vancouver, B.C. V6H 1G7

Pentium III~Game Blaster

Intel Pentium III Processor/133MHz Bus
Asus CUV4X VIA Apollo Pro 133A ATX Board
128MB 168 Pin SDRAM (PC133MHz)
1.44MB Floppy Drive
15GB Ultra DMA-66 7200RPM IDE Hard Drive
Ultra DMA66 Cont. w/2x16550 Serial,1xBi-Directional Parallel
AGP 3dfx Voodoo 3000 Graphics Card with 16MB
Creative Labs Live! Value Card Environmental Audio
50x Speed UDMA CD-ROM
MLI-480 Sub-woofer Speaker
Samsung 750S 17" .27mm DP NI SVGA Monitor
ATX Mid Tower Case with CSA Power Supply
107-keys Windows 98 Keyboard,PS/2 Mouse
2 Year Parts & Service Warranty

PIII 533MHz 256KB L2 ... $1,[illegible]
PIII 600MHz 256KB L2 ... $1,595
PIII 667MHz 256KB L2 ... $1,620
PIII 733MHz 256KB L2 ... $1,715
PIII 800MHz 256KB L2 ... $2,000

Ultimate Power Station

Intel Pentium III Processor/133MHz Bus
Asus CUV4X VIA Apollo Pro 133A ATX Board
128MB 168 Pin SDRAM (PC133MHz)
1.44MB Floppy Drive
20GB Ultra DMA-66 7200RPM IDE Hard Drive
Ultra DMA66 Cont. w/2x16550 Serial,1xBi-Directional Parallel
AGP nVidia TNT2 Ultra Card 32MB TV Out
Aureal Vertex 2 SuperQuad A3D 2.0 Sound Card
50x Speed UDMA CD-ROM
Altec Lansing 45.2 Sub-woofer Speaker
Samsung 753DF 17" .27mm DP DynaFlat Monitor
ATX Mid Tower Case with CSA Power Supply
107-keys Windows 98 Keyboard,PS/2 Mouse
2 Year Parts & Service Warranty

PIII [illegible]MHz 256KB L2...$1,790
PIII [illegible]MHz 256KB L2...$1,875
PIII [illegible]MHz 256KB L2...$1,910
PIII [illegible]MHz 256KB L2...$2,[illegible]
PIII [illegible]MHz 256KB L2...$2,[illegible]

MEMORY SALE!

16MB 60ns 72-Pin EDO SIMM	$[illegible]
32MB 60ns 72-Pin EDO SIMM	$117.00
32MB SDRAM PC 100 compliant	$40.00
64MB SDRAM PC 100 compliant	$85.50
128MB SDRAM PC 100 compliant	$183.00
256MB SDRAM PC 100 compliant	$368.00
128MB SDRAM PC-133 compliant	$195.00
256MB SDRAM PC 133 compliant	$385.00
128MB ECC SDRAM PC 100 compliant	$185.00
256MB ECC SDRAM PC 100 compliant	$408.00
128MB ECC SDRAM PC 133 compliant	$[illegible]
256MB ECC SDRAM PC 133 compliant	$[illegible]

BASF Verbatim Sony CDR

BASF CDR [illegible]
SONY CDR - $1.55
Datawrite 80min CDR - $1.60

Iomega Zip / 56K Modem

100MB Zip Disk $12.50

V.90 Internal Fax Voice Modem $22.00

MICROCONCEPT NETWORK PRODUCTS FOR LESS !!

NOVELL Software

NetWare v3.2

NetWare v3.2 5/10 User	$1440/3030
NetWare v3.2 25/50 User	$5270/8080
NetWare v3.2 Enhancement Pack	$505

IntraNetWare v5.1

NetWare 5.1 Server Plus 5 User Lic.	$1835
NetWare 5.1 5/10 Additive Lic. Only	$1210/1720
NetWare 5.1 25/50 Additive Lic. Only	$5030/8030

Netware Small Business Suite v5

Netware Small Business v5 Server w/5 user	$1500
Netware Small Business v5 Connection Lic.	$[illegible]

MICROSOFT NT

Windows NT Server v4.0 CD w/5 Clients Lic.	$1005
Windows NT Server v4.0 CD w/10 Clients Lic.	$1540
Windows NT v4.0 Client Access Lic.	$[illegible]
Windows NT Workstation 4.0 CD	$430
Windows 2000 Server w/5 Clients Lic.	$1380
Windows 2000 Server w/10 Clients Lic.	$1630
Windows 2000 Professional	$430
BackOffice Small Business Server v4.5 w/5 Clients	$2075
BackOffice Server v4.5 w/5 Clients	$4320
Microsoft SMS version 2.0 w/10 Clients Lic.	$1460
Microsoft SMS version 2.0 w/25 Clients Lic.	$2465
Windows 2000 Terminal [illegible] w/5 Clients	$[illegible]

Network Printers

Optra M410 LEXMARK
1200dpi Image Quality
$1030.00

HP [illegible] Laserjet, 1200dpi 17ppm	$1885
HP 4050N Laserjet 1200dpi 17ppm 16MB,Network	$2190
HP 4050TN Laserjet 1200 dpi 17ppm,16MB,Network	$2385
HP 5000 Laserjet, 1200dpi 16ppm, 11x17"	$2235
HP 5000N Laserjet 1200dpi 16ppm,11x17",Network	$3156
HP 5000GN Laserjet,1200dpi Graphics intensive	$3965
HP 8100 Laserjet,1200dpi 32ppm	$4006
HP 8100N Laserjet 1200dpi 32ppm,Network	$4460
HP 8100DN Laserjet,1200dpi 32ppm Duplexer	$4175
HP 4500 Color Laserjet 600dpi(Ret2400) 32MB	$3785
HP 4500N Color Laserjet 600dpi 64MB,Network	$4430
HP 8550 Color Laserjet 600dpi 12x18" 32MB	$7085
HP 8550N Color Laserjet 600dpi 32MB Network	$8836
Lexmark Optra E310 8ppm 2MB	$670
Lexmark Optra M410n 17ppm 4MB USB	$1250
Lexmark Optra T610 15ppm 4MB Parallel	$1485
Lexmark Optra T610n 15ppm 8MB 10/100BaseTx	$1930
Lexmark Optra T612 20ppm 8MB Parallel & Serial	$1365
Lexmark Optra T612n,20ppm 16MB 10/100BaseTx	$2130
Lexmark Optra T614,25ppm 8MB Parallel	$1700
Lexmark Optra T614n,25ppm 16MB 10/100BaseTx	$2480
Lexmark Optra T616 35ppm 16MB Parallel	$2850
Lexmark Optra T616n 35ppm 16MB 10/100BaseTx	$3500
Lexmark Optra W810 35ppm 16MB 11x17" Parallel	$3840
Lexmark Optra W810n 35ppm,16MB 11x17" Network	$4885
Lexmark Optra C710 3ppm 32MB 1200dpi	$2912
Lexmark Optra C710N,3ppm 32MB 1200dpi Network	$3318
Lexmark Optra Color 1200 2ppm 1200dpi,11x17"	$5370
Lexmark Optra Color 1200N 12ppm 1200dpi 11x17"	$6475

Tape / CD ROM Drive

Hewlett Packard SureStore 8GB Int/Ext DAT Drive	$946/1110
Hewlett Packard SureStore 24GB Int/Ext DAT Drive	$1236/1410
Hewlett Packard SureStore 40GB Int/Ext DDS-4 DAT	$1645/19[illegible]
Hewlett Packard SureStore DLT 40/e SCSI Drive	$2828/2920
Hewlett Packard SureStore DLT 80/e SCSI Drive	$6466/6730
Onstream 30GB IDE/SCSI Int. Drive Echo SW Incl	$425/710
Onstream 50GB SCSI Int. Drive Echo SW Incl	$[illegible]
Quantum DLT4000 40GB Int/Ext SCSI Drive	$2186/2790
Quantum DLT8000 80GB Int/Ext SCSI Drive	$6320/6720
Seagate Scorpion 8GB DAT Int/Ext Drive	$778/855
Seagate Scorpion 24GB DAT Int/Ext Drive	$1086/1236
Seagate Scorpion 96GB DAT Int/Ext Drive	$3175/3530
Seagate Scorpion 240GB DAT Internal SCSI Drive	$3500.00
Seagate TapeStore 20GB IDE/SCSI Drive	$380/418
Sony SuperStation 10GB Int/Ext Drive	$230/268
Sony SDT 7000 Int/Ext 4-8GB DAT	$835/1015
Sony SDT 9000 Int/Ext 24GB DAT	$[illegible]/1240
Sony SDT 11000 Int. 40GB DDS-4 DAT SCSI	$1395
Sony AIT 100GB Int/Ext [illegible]	$5363/5950

Power Protection

APC BackUPS 300
$126.00

American Power 120 Volt

BackUPS 300/500M/650M	$128/158/354
BackUPS Pro 280/350/420	$198/212/288
BackUPS Pro 550/650	$238/368
BackUPS Pro 1000/1400	$600/700
SmartUPS SU420/SU620NET	$320/415
SmartUPS SU700/SU1000/SU1400NET	$448/720/850
SmartUPS SU2200/SU3000/5000NET	$1380/2150/3800
Back UPS Office BF350/BF500	$117/148
Matrix 5000VA/3000VA (Modular UPS)	$3800/5140
SmartCell for Matrix 3000/5000	$710
Line Conditioner LR600/LR1250	$1261/175
Personal SurgeArrest 7/7 Outlets with Tel	$28 [illegible]
Professional SurgeArrest 7/7 Outlets with Tel	$[illegible]
Professional SurgeArrest 8/8 Outlets with Tel	$44/58
Network SurgeArrest 7/7 Outlets with Tel	$45/[illegible]
Notebook Surge Protector	$[illegible]
Battery for Compaq/IBM/Toshiba Notebook	[illegible]

Cables & Jacks

Twisted Pair

Assembly Cat.5 10/100BaseT Cable 10/15/25 ft	$8/10/12
Assembly Cat.5 10/100BaseT Cable 50/75/100 ft	$18/27/33
Cable Cat.5 10/100BaseT Category per ft	$0.30
Cable Cat.5 10/100BaseT Category per 1000 ft	$140
Connector RJ45M	$0.30
Tool RJ45 Crimping	$2[illegible]
Multi-Network Cable Tester	$30

Coaxial

Assembly RG58/AU Thin Coax 25/50 ft	$18/23
Assembly RG58/AU Thin Coax 100 ft	$55
Cable RG58/AU Bulk per ft	$0.25
Cable RG58/AU Bulk per 1000 ft	$180
Connector BNC "T"	$2.50
Terminator BNC, 52 ohm	$2.50
Tool BNC Crimping	$30
Terminator BNC 52 ohm w/ground strap	$1.00

10BaseT/2 Adapters

3COM 3C509B-TPC ISA Ethernet Combo	$102
3COM 3C900B PCI Ethernet XL Combo	$105
AOpen PCI Ethernet Combo	$[illegible]
D-Link DE 220PCT ISA/DE 528CT+ PCI Combo	$2[illegible]/25
Intel PCLA8210B ISA EtherExpress Pro 10+ Combo	$[illegible]
Intel PILA8580 PCI EtherExpress Pro 10+ Combo	$175
SMC 1208BT PCMCIA Card Combo	$34
[illegible]	[illegible]

Print Servers/USB Hub

HP JetDirect J3258B 170X 10BaseT Ext Print Server	$[illegible]
HP JetDirect J4169A 610N 10/100BaseT Print Server	$580
HP JetDirect J3263A 300X 10/100BaseT Ext Print Server	$383
HP JetDirect J3265A 500X 10/100BaseT Ext Print Server	$488
HP JetDirect J3110A 600N RJ45 10BaseT	$382
HP JetDirect J3113A 600N 10/100BaseT	$400
HP JetDirect J4135A USB Connectivity Card	$100
Intel NetportExpress Pro Ext. Printer Server PCLA2151	$378
Intel NetportExpress 10/100 Ext. Printer Server 1 Port	$310
Intel NetportExpress 10/100 Ext. Printer Server 3 Port	$458
Intel InBusiness Print Station SPS110TX2US	$238
Netgear PS104 4 Port 10BaseT Print Server	$145
Netgear PS110 10/100BaseT Print Server	$105
Linksys USBHUB04/SOHO USB Hub 4 Port	$40/43
Xircom Portgear USB Hub 4 Port/7 Port	$78/56

PCMCIA Adapters

D-Link DE 660CT PCMCIA Combo NE2000 Compatible	$74
Xircom Realport 10/100 Ethernet + 56K v.90 Modem	$380
Xircom Realport 10/100 Fast Ethernet CardBus	$210
Xircom Realport RM56V1 56K v.90 Modem	$182
Xircom Realport 2 REM56G Win2000 56K Modem	$188
Xircom Realport 2 R2BM56WG 56K W-Global Modem	$225
Xircom Realport 2 R2BE 100BTX 10/100 Ethernet	$220

10 BaseT Hubs

3COM 3C16440 SuperStack 1 Entry Hub 12 Port	$228
3COM 3C16441 SuperStack 1 Entry Hub 24 Port	$346
3COM 3C16405 SuperStack 1 PS Hub 40 12 Port	$730
3COM 3C16406 SuperStack 1 PS Hub 40 24 Port	$1270
3COM 3C16450 SuperStack 1 PS Hub 50 24 Port	$1370
3COM 3C16610A SuperStack 1 Hub 10 12 Port	$740
3COM 3C16611A SuperStack 1 Hub 10 24 Port	$1820
3COM 3C16610 SuperStack 1 Dual Speed Hub 12 Port	$870
3COM 3C16611 SuperStack 1 Dual Speed Hub 24 Port	$1335
3COM 3C16700A OfficeConnect 8/TPO	$120
3COM 3C16701A OfficeConnect 8/TPC	$180
3COM 3C16702A OfficeConnect 16/TPC	$255
3COM 3C16704A OfficeConnect 4/TPO	$72
3COM 3C16700 OfficeConnect 8/TPM	$495
AOpen SOHO 5+ 5 Port/528 8 Port Hub	$30/40
D-Link DE-805 TP C 5 Port Hub	$63
D-Link DE-809TC 8 Port/DE-812TP+ 12 Port Hub	$60/200
D-Link DE-816TP 16 Port/DE-824TP 24 Port Hub	$162/294
Intel InBusiness SH10T5 5 Port/SH10T8US 8 Port Hub	$75/58
Intel InBusiness SH10T8B 8 Port Hub (with coax)	$115
Intel InBusiness SR10TP8US Internet Station	$580
Netgear EN104TPNA/EN108NA 4 Port Hub	$43/64
Netgear EN108TP 8 Port Hub	$82
Netgear EN108TPNA/EN108NA 8 Port Hub	$63/75
Netgear EN116NA 16 Port Hub	$128
SMC 3605T EZ 5 Port/SMC 3608T EZ 8 Port Hub	$55.60
SMC 1610 C-EZ 16 Port Hub (with coax)	$65

10 BaseT Adapters

3COM 3C509B/3C900B ISA/PCI Ethernet TPO	$80/77
3COM 3C18250 10BaseT USB Network Interface	$[illegible]
Intel PCLA8210B ISA/PILA8520 PCI EtherExpress	$80/120
Netgear EA[illegible] 10BaseT ISA Network Interface	$55

Switches

3COM 3C16733 OfficeConnect Switch 4 10/100BaseT	$2[illegible]
3COM 3C16951 SuperStack II 10 Switch 1100 12 Port	$[illegible]
3COM 3C16950 SuperStack II 10 Switch 1100 24 Port	$1350
3COM 3C16981 SuperStack II 100 Switch 3300 12 Port	$1730
3COM 3C16980 SuperStack II 100 Switch 3300 24 Port	$2440
3COM 3C39024 SuperStack II 100 Switch 3900 24 Port	$4180
CISCO Catalyst 2912-XL-A 10/100 Switch 12 Port	$1690
CISCO Catalyst 2924-XL-A 10/100 Switch 24 Port	$2[illegible]
D-Link DSS-5+ 10/100 5 NWay Desktop Switch	$1[illegible]
D-Link DSS-8+ 10/100 8 NWay Desktop Switch	$1[illegible]
D-Link DSS-16+ 10/100 16 NWay Rackmount Switch	$405
D-Link DSS-24 10/100 24 Port Switch	$10[illegible]
HP J4120A ProCurve 1600M 16 Port 10/100 Switch	$1550
HP J4121A ProCurve 4000M 40 Port 10/100 Switch	$34[illegible]
Intel InBusiness SS101TX8 8 Port Switch	$3[illegible]
Intel Express 410T 10/100 Standalone Switch 16 Port	$[illegible]
Intel Express 410T 10/100 Standalone Switch 24 Port	$12[illegible]
Intel Express 460T 10/100 Standalone Switch 16 Port	$1[illegible]
Intel Express 460T 10/100 Standalone Switch 24 Port	$1[illegible]
Intel Express 520T 10/100 Scalable Switch 12 Port	$19[illegible]
Intel Express ES1000/SRPUS Gigabit Switch 7 Port	$1250[illegible]
Netgear FS105NA 5 10/100BaseT Port Switch	$[illegible]
Netgear FS105 5 10/100BaseT Port Switch(Slimline)	$14[illegible]
Netgear FS108NA 8 10/100BaseT Port Switch	$21[illegible]

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3COM 3C905B TX PCI
Fast Ethernet Adapter
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3COM [illegible]05C TX M FastEtherLink PC Management	$1[illegible]
3COM 3C905B-COMBO Fast EtherLink 10/100 Combo	$203
3COM 3CR990-TX-95 EtherLink 3XP 56 Bit Encryption	$14[illegible]
3COM 3CR990-TX-97 EtherLink 3XP 168 Bit Encryption	$1[illegible]
3COM 3C980C-TX Fast EtherLink Server Card	$[illegible]
3COM 3C985B-SX Gigabit EtherLink Server Card	$187[illegible]
3COM 3C16722 OfficeConnect FastEthernet 8 Port Hub	$[illegible]
3COM 3C16721 OfficeConnect FastEthernet 12 Port Hub	$[illegible]
3COM 3C16750B OfficeConnect 10/100 8 Port Hub	$[illegible]
3COM 3C16751B OfficeConnect 10/100 16 Port Hub	$[illegible]
D-Link DFE 530TX 10/100 PCI FastEthernet Adapter	$[illegible]
D-Link DFE 570TX 10/100 4 Port PCI Server Adapter	$[illegible]
D-Link DFE-904 10/100 Dual Speed 4 Port Hub	$[illegible]
D-Link DFE 916 FastEthernet 16 Port Stackable Hub	$[illegible]
D-Link DFE 2624i Dual Speed 10/100 24 Port Hub	$1250
D-Link DSH 5 Dual Speed 10/100 5 Port Hub w/Switch	$[illegible]
D-Link DSH-8 Dual Speed 10/100 8 Port Hub w/Switch	$[illegible]
D-Link DSH 16 Dual Speed 10/100 16 Port Hub/Switch	$2[illegible]
HP J3294A ProCurve 10/100BaseT 12 Port Hub	$81[illegible]
Intel PILA8460 Pro 100+ PCI Fast Ethernet Adapter	$[illegible]
Intel PILA8470 EtherExpress Pro/100+ Server Adapter	$[illegible]
Intel PILA8472 Pro 100+ Dual Port Server Adapter	$[illegible]
Intel PWLA8490 Pro/1000 Gigabit Server Adapter	$[illegible]
Intel InBusiness SH100TX4 FastEthernet 4 Port Hub	$149
Intel InBusiness SH101TX8 FastEthernet 8 10/100 Hub	$3[illegible]
Intel InBusiness SH101TX16 FastEthernet 16 10/100 Hub	$[illegible]55
Intel Express 330T Stackable Hub 10/100 16 Port	$765
Intel Express 330T Stackable Hub 10/100 24 Port	$1[illegible]
Netgear FA310TX 100 PCI FastEthernet	$[illegible]
Netgear GA620NA Gigabit Ethernet Card	$49[illegible]
Netgear FE104NA/FE108NA 100 4 Port/8 Port Hub	$[illegible]
Netgear DS104NA 10/100 Dual Speed 4 Port Hub	$1[illegible]
Netgear DS108NA 10/100 Dual Speed 8 Port Hub	$1[illegible]
Netgear DS116NA 10/100 Dual Speed 16 Port Hub	$1[illegible]
Netgear DS516NA Dual Speed 16 Port Stackable Hub	$[illegible]63
Netgear DS524NA Dual Speed 24 Port Stackable Hub	$5[illegible]0
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Okipage 8w	8	600x600	$385
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Okipage 12i	12	600x600	$955
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ML390/391	390	24	$540/730
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18.4GB	ST318404LW	5.2ms	4MB	10000	ULTRA 160	$770
36.4GB	ST136475LW	7.4ms	1MB	7200	ULTRA 2 SCSI	$1200
36.4GB	ST136403LW	5.7ms	1MB	10000	ULTRA 2 SCSI	$1360
36.7GB	ST336704LW	5.2ms	4MB	10000	ULTRA 160	$1375
50.1GB	ST150176LW	7.4ms	1MB	7200	ULTRA 2 SCSI	$1380
73.4GB	ST173404LW	5.2ms	4MB	10000	ULTRA 160	[illegible]
9.1GB	DNES-309170	7ms	2MB	7200	ULTRA 2 SCSI	$380
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18.3GB	07N3210	4.5ms	4MB	10000	ULTRA 160	$760
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36.7GB	09L3903	8.5ms	2MB	10000	ULTRA 2 SCSI	$1295
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9.1GB	WD9150-0040	5.2ms	2MB	10000	ULTRA 2 SCSI	$345
9.1GB	WD9150-0061	5.2ms	8MB	10000	ULTRA 2 SCSI	$350
18.3GB	WD18310-040	5.2ms	2MB	10000	ULTRA 2 SCSI	$620
18.3GB	WD18310-051	5.2ms	8MB	10000	ULTRA 2 SCSI	$660
9.1GB	QM309100KN	6.9ms	2MB	7200	ULTRA 2 SCSI	$335
9.1GB	QM309100TN	5ms	2MB	10000	ULTRA 2 SCSI	$520
18.2GB	QM318300KC	8.3ms	4MB	7200	ULTRA 160	$535
18.2GB	QM318200TN	5ms	2MB	10000	ULTRA 2 SCSI	$805
36.4GB	QM336700KC	6.3ms	4MB	7200	ULTRA 160	$1070
36.4GB	QM336400TN	5.5ms	2MB	10000	ULTRA 2 SCSI	$1418
73.4GB	QM373410TY	5ms	8MB	10000	ULTRA 160	$2788
9.1GB	MAE3091LP	10ms	256KB	7200	ULTRA 2 SCSI	$325
9.1GB	MAG3091LP	7.5ms	2MB	10000	ULTRA 2 SCSI	$485
18.2GB	MAE3182LP	10ms	256KB	7200	ULTRA 2 SCSI	$505
18.2GB	MAG3182LP	7.5ms	2MB	10000	ULTRA 2 SCSI	$725
36.4GB	MAF3364LP	5.7ms	4MB	10000	ULTRA 2 SCSI	$1335

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1460	Cel466	64MB	6.4GB	DVD	14.1 TFT	56K	$2,810
1482	Cel500	64MB	[illegible]	[illegible]	14.1 TFT	56K	[illegible]
1492	P3-500	64MB	12GB	DVD	15.0 TFT	56K	$3,910
15[illegible]	Cel500	64MB	12GB	[illegible]	[illegible]	56K	$2,700
240	Cel366	64MB	6.4GB		10.4 TFT	56K	$2,560
240	Cel400	64MB	12GB		10.4 TFT	56K	$2,[illegible]
390X	P3-450	64MB	12GB	24X	14.1 TFT	56K	$3,915
390X	P3-500	64MB	12GB	[illegible]	[illegible]	56K	$4,[illegible]
600X	P3-450	64MB	6.0GB	24X	13.3 TFT	56K	$3,975
600X	P3-500	64MB	12GB	24X	13.3 TFT	56K	$4,470
600X	P3-500	64MB	12GB	DVD	13.3 TFT	56K	$4,870
600X	P3-650	64MB	12GB	DVD	13.3 TFT	56K	$5,378
A20m	Cel500	64MB	6.0GB	24X	12.1 TFT	56K	$2,745
A20m	Cel500	64MB	6.0GB	24X	12.1 TFT	Combo	$2,845
A20m	P3-500	64MB	6.0GB	24X	12.1 TFT	56K	$3,095
A20m	P3-500	64MB	6.0GB	24X	12.1 TFT	Combo	$3,195
A20m	Cel500	64MB	12GB	24X	15 TFT	56K	$3,495
A20m	Cel500	64MB	12GB	24X	15 TFT	Combo	$3,595
A20m	P3-700	64MB	12GB	24X	14.1 TFT	56K	$4,395
A20m	P3-700	64MB	12GB	24X	14.1 TFT	Combo	$4,495
A20p	P3-700	128MB	18GB	DVD	15 TFT	56K	$5,895
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T20	P3-650	128MB	6.0GB	24X	13.3 TFT	56K	$4,695
T20	P3-650	128MB	6.0GB	24X	13.3 TFT	Combo	$4,795
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Model	CPU	RAM	HDD	CD	Display	Price
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2140CDS	K6/450	64MB	4.0GB	24X	12.1 DSTN	$1,685
2180CDT	K6/475	64MB	4.0GB	24X	12.1 TFT	$2,395
3110CT	PII300	64MB	6.4GB		10.4 TFT	$2,590
3440CT	P3-500	64MB	6.0GB		13.3 TFT	$3,675
4070CDS	Cel366	64MB	4.3GB	24X	13 DSTN	$2,070
4270DVD	Cel500	64MB	6.0GB	DVD	14.1 TFT	$3,200
4270ZDVD	Cel500	64MB	12GB	DVD	15.0 TFT	$3,890
4260DVD	P3-450	64MB	12GB	DVD	14.1 TFT	$3,800
4300	P3-600	64MB	12GB	DVD	14.1 TFT	$4,495
8100	P3-500	64MB	12GB	DVD	14.1 TFT	$4,925
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343TV	P3-500	128MB	12GB	DVD	12.1 TFT	$3,535
507T	Cel466	64MB	4.8GB	24X	12.1 TFT	$1,700
514TXV	Cel466	64MB	6GB	DVD	14.1 TFT	$2,780
602TE	[illegible]	128MB	12GB	CDR	[illegible] TFT	$3,[illegible]
730TXV	P3-450	64MB	6GB	DVD	14.1 TFT	$3,290
732TXV	P3-500	64MB	6GB	DVD	14.1 TFT	$3,430
732TLV	P3-500	128MB	12GB	DVD	15 TFT	$3,960
734TXV	P3-600	64MB	6GB	DVD	14.1 TFT	$3,720
734TL	P3-600	64MB	12GB	24X	15 TFT	$3,860
[illegible]	[illegible]	128MB	12GB	[illegible]	14.1 TFT	$4,240
748TL	P3-650	128MB	18GB	24X	15 TFT	$4,940
737TLV	P3-700	128MB	18GB	DVD	15 TFT	$4,950

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AMD K6-2 475MHz CPU
32MB RAM
5GB Hard Drive
Trident CyberBlade 3D Graphics
24X CD-ROM
56KBps Fax Modem
12.1" HPA Display
$1,875

Model	CPU	RAM	HDD	CD	Display	Price
V300	Cel466	32MB	6GB	24X	13.3 HPA	$2,190
V300	Cel500	64MB	6GB	24X	14.1 TFT	$3,200
M300	P3-500	64MB	6GB		11.3 TFT	$3,850
M300	P3-500	64MB	12GB		11.3 TFT	$4,210
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Have wireless will travel

A wireless Ethernet card may become an indispensable peripheral for travelling notebook users as airports and other facilities embrace the 802.11b standard

By Tom Venetis

Notebook computer equipped travellers will soon be able to wirelessly connect to the Internet at speeds equal to those available to their desktop PCs via the office LAN

Recently, the Vancouver International Airport began offering travellers access to a wireless network that will allow them to connect to the Internet, and in some cases their corporate email accounts, at speeds approaching 11 Mbps

Viji Maini manager for airport systems in the Vancouver International Airport Authority's information technology department says the airport is known for being at the forefront of technological change Integrating an airport wide wireless solution was something the authority decided was best for its customers

"Business passengers have rated the Vancouver airport as the number one airport in terms of the service they get," Maini adds "And we have had requests about Internet access and questions about what our strategy for wireless was. So we did an evaluation of some of the technologies available and selected to go with a high speed wireless because of the advantages it offered.

The 802.11b connection

Wireless Internet connectivity is being enabled through devices that conform to an Ethernet standard known as 802.11b, which supports data transmission rates of up to 11 Mbps comparable to standard Ethernet's 10 Mbps. A typical setup includes three components. a network switch or access controller wireless access points, and wireless 802.11b Ethernet cards

The access points are distributed throughout the area where network access is required The access points are connected to a switch, which in turn is connected to services like Internet access Notebook computers can gain access to the resulting network if they are equipped with wireless 802.11b Ethernet cards So, the theory is, no matter where passengers are in the airport they should be able to connect to the network and out onto the Internet if they have a compatible 802.11b card installed in their computer

To help install this network, the Vancouver airport worked with Nokia, which contracted Vancouver based ZooLink Communications Ltd. to integrate and support the network with the airport authority

"We are in partnership with Nokia right now to use their 802.11 hardware to cover the airport with access points" says Yen Choi, director of technology with ZooLink. "We have 59 access points in the airport which are connected by fiber to an access controller It allows any business traveler, or anybody in the airport with a wireless LAN card, to have high speed Internet access"

In order for someone to use the network, users will need a Nokia Wireless Local Area Network (WLAN) card If a traveler does not have such a card one can be purchased for $299.95 at any one of the ZooLink kiosks in the airport. They can also choose to rent one and purchase blocks of time from 15 minutes up to a flat rate all day fee. The kiosks will also supply any technical support a traveler may need.

ZooLink Communications uses Nokia's WLAN card and access points to offer wireless Net access at Vancouver International Airport.

Once connected to the network, travelers will be able to access specialized information such as real time flight information, and tourist and hotel information

ZooLink and Vancouver's airport authority are not the only ones looking to provide wireless connectivity to travelers.

Austin Tex. based Wayport Inc. specializes in developing wireless technologies for airports and hotels across North America and Canada.

"We formed the company to basically solve the problem of connectivity for travelers," says Dirk Heinen vice-president of marketing for Wayport

In March Wayport announced an agreement with Marshall Management Inc. a Maryland based hotel management firm, to provide wireless and wired high speed Internet access at some 15 hotels in six U.S states These networks will let hotel guests connect to the Internet and corporate networks at speeds up to 50 times faster than normal dial-up

Wayport has installed wireless networks at four airports across North America including the Dallas International Airport Like the Nokia network in Vancouver the Wayport network allow travelers to connect anywhere in the airport The network is open to any 802.11 wireless modem or device so users do not need a specific manufacturer's card to connect to the system

Recognizing that more people are demanding access to networks wherever they are Burlington, Ont. based 3Com Corp announced that it will begin working more closely with visitor based network service providers to integrate 3Com's own set of wireless and network technologies into public areas

"We recognize the requirement that people want to connect wherever they are" says Glen Lavigne, sales director for 3Com's visitor-based network division for the Americas. "Our vision is to extend the reach of the corporate office into spaces where business travelers are whether it is a hotel, a public lobby or public building

Enter Bluetooth

Toronto-based Classwave Wireless Inc. also sees a growing market for publicly accessible wireless networks, although the company believes such networks will be based not around the 802.11 wireless standard but around Bluetooth Also referred to as a wire-replacement technology Bluetooth has a shorter range than 802.11b, but because of its low power requirements, can be used in cellular phones, pagers and other lightweight devices.

In April, Classwave unveiled its Polyphony server software that allows application service providers to exchange digital information with a variety of Bluetooth-enabled devices such as cellular phones and PDAs

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Working wirelessly

I recently attended a meeting in Vancouver where the organizer had hired Wayport to set up a temporary 802.11b wireless network in the hotel meeting rooms.

Technicians installed Lucent PC Card wireless LAN cards in our notebooks when we arrived at the hotel, and when I fired up my notebook for the first meeting the next morning, email and Internet access were there, just as if I'd plugged into the LAN at work.

Passing through the Vancouver Airport on the way home, I noticed the Nokia kiosk advertising the wireless email and Internet access service In talking with the person at the booth, we determined that my Lucent PC Card should work since both it and the Nokia installation appeared to be based on 802.11b. He said the system was still in the trial phase but gave me a user ID and password so that I could test it. Alas, no luck at the airport. I didn't have time to determine where the problem lay—with the system or some incompatibility with the network card—but the possibilities are interesting.

Wireless networking is like high-speed Internet service once you've tasted it, it's hard to go back. Last year I tested a Diamond Multimedia wireless network system for the home, based on the HomeRF standard. It was great to be able to fire up my notebook in any room of the house and have access to email and the Internet. The problem I encountered with it was incompatibility with the Ethernet LAN at work—I had to change settings on the notebook each time I shuttled it between home and work

The 802.11b wireless standard seems to make more sense as a universal standard for home and work A 3Com representative said there's a good chance 3Com will be developing home networking products based on its AirConnect wireless products which presently are aimed at business customers

—*David Tanaka*

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The ergonomics of IT

Continued from page 14

have an anti glare monitor or eliminate glare at the source."

A simple and effective suggestion from Goyert to reduce eye strain is to make sure your monitor isn't set up in front of a window so that your eyes don't have to constantly adjust between the light from outside and the screen. Instead, place your monitor in front of a background that is not the source of a lot of bright light. Also Goyert likes the idea of having a copy holder at the side of the monitor so you don't have to look down to see what you're typing from.

"There's lots of ways to adjust your workstation," Goyert says. "One of my favourites for adjusting monitor height is to use a telephone book—if it's too high you just slice out a few pages, or if it's too low just add another phone book."

He also stresses that properly setting up your workstation is not the whole answer to avoiding ergonomic related problems. Doing that functions instead as more of a mitigating influence. "If you're sitting for eight hours a day doing data entry on a computer, you just can't expect not to have any problems. So, what you have to do is get some rest from that constant repetition. Adjust your work so that every so often—there's no hard and fast rule about time—you get up and move around, change your position."

One helpful thing you can do is make sure your printer isn't right next to your computer so that you have to get up and walk down the hall or across the room to get your printouts. There are also numerous booklets and charts and software packages that show stretches you can do at your desk periodically.

"I think they're great," Goyert says. "But what I find is that people tend to, unfortunately, tack them up on their bulletin boards or put them on the bookshelf or whatever and never look at them again. Even those programs that pop up on the screen to tell you when it's time to stretch often simply get switched off and ignored.

"The thing to remember is that there's no one thing that's going to do the trick. You have to do everything—set up your workstation to fix your awkward posture, reduce the repetition and the forceful exertions in your work and take breaks to stretch or move around," Goyert says.

Manahan cites Compaq's *Comfort and Safety Guide*, a booklet that is shipped with all of the company's products and is freely available to anyone wishing to receive a copy. She says the information it contains is from the ergonomic research organizations mentioned earlier and is presented in a simple, easy-to-follow fashion.

"Our *Comfort and Safety Guide* reflects the current research into the ergonomics issue," she explains. "In the past, for example, it was thought there was only one perfect posture, one way to hold the body when working at a computer. But I think what our guide shows is that now there's a range of postures that can be appropriate. I think if you're shopping for a desk or a chair or other components needed for a workstation, it's very important that you can make adjustments and changes to that equipment regularly and easily."

There are some very basic concepts that users should be aware of, says Dr Keith Phillips, who sits on the B.C. Medical

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Have wireless will travel

Continued from page 21

Simon Arnason, founder and chief technology officer for Classwave, says the Polyphony server could be used in such areas as shopping malls, grocery stores and other public places to deliver specialized digital content to Bluetooth enabled devices. A shopping mall can send information on sales to a customer's Bluetooth ready PDA or someone could dial up to get information about a store location via a Bluetooth ready cellular phone. Bookstores could use Bluetooth to deliver news highlights or book reviews to a variety of different devices.

"In the future world, there will be so much activity and applications for the server that we have created, it will boggle the mind," Arnason adds. "Bluetooth—being an unregulated and uncontrolled space, a frequency that does not require licensing—it creates fantastic opportunities for low cost wireless delivery."

Arnason also believes criticisms of the difficulty of networking an area wider than one's desk with Bluetooth are premature. Because Bluetooth technology is inexpensive, it will not cost companies a lot to Bluetooth enable devices or to set up Bluetooth access points around an office or public space.

"Bluetooth also has a greater acceptance among manufactures and software vendors, and the people building silicon," Arnason says. "The cost of manufacturing the appliances is far less." ❑

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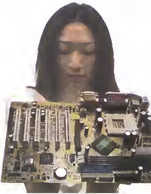

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ASUS AGP V6800 GeForce DDR 32MB Deluxe	**$438**
ASUS AGP V6800 GeForce DDR 64MB	**$478**
ASUS AGP V6800 GeForce DDR2 64MB Deluxe	**$Call**
3Dfx AGP Voodoo III 2000 16MB (Retail)	$149
3Dfx AGP Voodoo III 3000 16MB (Retail)	$199
3Dfx AGP Voodoo III 3500 16MB TVTuner (Retail)	$[illegible]
3Dfx AGP Voodoo V 5500 64MB TVTuner (Retail)	**$Call**

Modem / PCMCIA

3Com-USR V90 56k PCI FaxModem (OEM)	**$54**
3Com-USR V90 56k PCI (2977 Hardware) FaxModem (OEM)	**$[illegible]**
3Com-USR V90 56k PCI (2976 Hardware) Voice FaxModem (OEM)	**$[illegible]**
3Com-USR PCMCIA 3CCM556 56K Modem (Retail)	$200
3Com-USR PCMCIA 3CCFEM556B 56K / 10/100 Lan	$445
Aopen PCI / ISA 56k V90 Voice Fax modem Retail	**$45 / 78**
Xircom CreditCard (PCMCIA) 56K Modem (Retail)	$199
Xircom RBEM56G RealPort 56K+10/100Lan CardBus (Retail)	$[illegible]

Printer

Brother Laser Jet HL1030 (Windows Only)	$399
Brother Laser Jet III 1240DX 600dpi 12ppm 2MB	**$459**
Brother Laser Jet III 1270DX 1200dpi 12ppm 4MB	$559
Epson DeskJet Stylus 440 720 dpi (Windows Only)	$148
Epson DeskJet Stylus 660 / 760 USB 1440 dpi	$199 / 259
Epson Stylus Photo 750 720x720	$[illegible]
Epson Stylus 900 / 900N	$[illegible]
HP DeskJet 610C / 840C / 990C Color	**$[illegible] / 239 / 465**
HP Multifunction 3150 Printer, Scanner, Copyer	**$[illegible]**
HP DeskJet 2000C / 2000CN Professional	$735 / 1266
HP LaserJet 1100 600dpi 8ppm 2MB	$578
HP LaserJet 2100 600dpi 10ppm 4MB	$[illegible]
HP 4050 4MB / 4050N 1200dpi 17ppm 8MB	$[illegible]
HP 5000 4MB / 5000N 1200dpi 16ppm 8MB (11x17)	$[illegible]
HP 8100 / 8100N 1200dpi 24ppm 16MB (11x17)	$[illegible]
Lexmark Z11 / Z31 / Z51 Inkjet 1200 dpi	$[illegible] / 298
Lexmark Optra E310 8ppm Postscript	$[illegible]
Lexmark Optra M410 12ppm 4MB USB/Parallel	**$[illegible]**

Scanner

Umax ASTRA 2000P / 2200P 1200dpi w/Photo Deluxe	$[illegible]
Umax ASTRA 2100U / 2200U SinglePass 1200dpi USB	$[illegible] / 586
Agfa Snapscan 1212 1200dpi Flatbed / USB	**$158**
Agfa Snapscan 1236S 1200dpi Flatbed	**$258**
Visioneer 7600 600x1200 dpi, 36-bit Parallel / USB	**$159**

Multimedia

Speakers

Creative Cambridge FPS2000 5.1 Theater speakers	**$398**
Creative PC Works Fourpoint surround FPS2000 / FPS1000	$226 / 118
Altec Lansing ACS48 PowerCube w Dolby Sound	$[illegible]
Altec Lansing ACS44 Speaker w/Subwoofer	**$98**
Altec Lansing ACS45 PowerCube System w/Subwoofer	**$98**
Altec Lansing ACS33 Speakers System	$72
Altec Lansing ACS90 Speakers System	$[illegible]
Marconmedia M-9900 Multi media Subwoofer System	$78
Marconmedia M-6100 Multimedia Subwoofer System	$47
Marconmedia M-4100 3way Speaker System	$55

Sound Card

SoundBlaster PCI Ensoniq Audio (OEM)	**$38**
SoundBlaster PCI 128 PnP (OEM)	**$58**
SoundBlaster PCI Live Value (OEM)	$78
Sound Blaster Live Platinum (Retail)	**$[illegible]**
Aureal Vortex2 SuperQuad PCI W/4 Spk	$79

CD /DVD Drive

Aopen 52X Creative 52X CD ROM	$[illegible]
Creative PC DVD RAM 5.2GB Int (Retail)	**$425**
Toshiba XM6502B 40X EIDE Int	$[illegible]
Toshiba SD-R1002 4XCDRW / 4XDVD / 24XCD NEW	**$478**
Pioneer DVD 16X DVD (Drive Only) / Slot Load	**$198 / 208**
ASUS DVD-XX IDE Int (Drive Only)	$[illegible]
Toshiba XM6402 40X CD-ROM SCSI Int	$[illegible]
Plextor UltraPlex Wide SCSI Int	$[illegible]
External Case for CD-ROM SCSI HDD	$[illegible]

Monitor

Optiquest [illegible] 1280x1024 .27mm	$315
Optiquest Q95 19" 1280x1024 .27mm (Horizontal)	$515
ViewSonic E771 17" 1280x1024 .27mm	$[illegible] / 385
Viewsonic EF70 17" .25mm PerfectFlat (New)	**$[illegible]**
Viewsonic PF775 17" .25mm PerfectFlat (New)	**$498**
Viewsonic PF790 19" .25mm PerfectFlat (New)	**$686**
ViewSonic VP151 15" LCD Monitor	$1468
Sony Multiscan PR [illegible] 17" [illegible] .25mm (Demo)	$[illegible]
Sony Multiscan CPD-E200 17" 1600 x 1200 .24mm FlatScreen	**$558**
Sony Multiscan CPD-E400 19" 1600 x 1200 .13mm (in stock)	**$770**
Sony Multiscan CPD-G400 19" 1800 x 1440 .24mm (in stock)	$865
Sony Multiscan CDM-E400 19" 1600 x 1200 .24mm (in stock)	$1145
Sony Multiscan [illegible] 2048 x 1536 .24mm in stock	**$1620**
Sony Multiscan CDM-F500 21" 1800 x 1440 .22mm (in stock)	**$2815**
ADI MicroScan Viewpoint 15" .21mm NI LR	**$[illegible]**
ADI MicroScan G[illegible] G55 17" .25mm NI LR	**$446 / $548**
ADI MicroScan G66 19" .26mm USB	**$668**
LG 995E 19" 1600 x 1280 .26mm	$538
LG 795 17" 1600 x 1280 .24mm Flatscreen	$499
Mitsubishi Diamond Pro 900u 19" .25mm FlatScreen	$918
Mitsubishi Diamond Pro 2060u 21" .25mm	$1745
Mag 786FD 17" Trinitron 1280 x 1024 .25mm FlatScreen	$[illegible]
Mag 800V 19" 1600 x 1200 .22mm	**$598**
NEC FE700 17" FlatScreen 1280 x 1024 .25mm	$[illegible]
NEC FE1250 22" FlatScreen 1800 x 1440 .25mm	$1320
Samsung Syncmaster 750S 17" .28 / 750B 17" .20	$280 / 345
Samsung Syncmaster 1000P 21" 1600 x 1[illegible] (Demo Special)	$[illegible]
Samsung Syncmaster 1100P 21" 1600 x 1200	$1198
Samsung Syncmaster DynaFlat 755DF 17" .[illegible]mm	$[illegible]
Samsung Syncmaster DynaFlat 700IFT 17" [illegible]	$435
Samsung Syncmaster DynaFlat 900IFT 19" [illegible]	$750
Samsung LCD 570B TFT 15 inch LCD Monitor (Demo Special)	**$1460**
Samsung LCD 170B TFT 18 inch LCD Monitor (Demo Special)	**$3150**

10/100MB Adapters

3Com Fast Etherlink XL PCI 3C905C TX 10/100BT (For Desktop)	$78
3Com Fast Etherlink XL PCI 3C905B TX 10/100BT (For Desktop)	$78
3Com Fast Etherlink PCI 3C980-TX 10/100BT (For Server)	$168
D-Link DFE 530TX PCI Fast Ethernet 10/100MB RJ-45	$32
Intel Pro 100+ PILA8460 PCI 10/100MB RJ-45 (OEM)	$78
Intel Pro 100+ PILA8470 PCI 10/100MB RJ-45 Server	$14[illegible]
Aopen ISA PCI 10BT and BNC Network Card	**$28**
Aopen PCI 10/100BT Network Card	$28

PCMCIA Cards

3Com/Megahertz PCMCIA 3CXFE575CT 10/100 CardBus	$210
3Com/Megahertz PCMCIA 3CCFEM556B 10/100Lan 56K Modem	$445
D-Link PCMCIA DFL-650TX Ethernet 10/100 MBLan	$99
D-Link PCMCIA DFE-660TX 56k & Ethernet 10MBLan	$200
Intel Pro/100 Mobile PCMCIA MBLA3200 10/100MBLan CardBus	$232
XirCom PCMCIA RE 100BT RealPort 10MB Special	$119
XirCom PCMCIA RE 100BTX RealPort Cardbus 10/100MB	$225

10/100MB HuB

10 BaseT Hub

Aopen 5 Port 10BT Hub	$49
Netgear NF 108 4Port 10BT Hub (Retail)	$38
Netgear Fa104 4Port 10/100M Lan Kit (Retail)	$158
D-Link DE 805TP 8 Port / DE 809TC or 809TC 9 Port Hub	$68 / 78

10/100 MB Dual Speed Hub and Switch

3Com OfficeConnect TP400 3C16700 4-Port 100Base-TX	$158
3Com OfficeConnect TP800 3C16701 8Port 100Base-TX	$239
3Com OfficeConnect TP1600 3C16702 16Port 100Base-TX	$404
3Com SuperStack II 3C16610 Dual Speed Hub 500 12 Port	$955
3Com SuperStack II 3C16611 Dual Speed Hub 500 24 Port	$1510
D-Link DSH-5 5 Port Hub 10/100MB Dual Speed	$155
D-Link DSH-8 8 Port Hub 10/100MB Dual Speed	$185
D-Link DSH-16 16 Port Hub 10/100MB Dual Speed	$556
D-Link DSS-5 5 Port switch 10/100MB Dual Speed	$153
D-Link DSS-8 8 Port Switch 10/100MB Dual Speed (Special)	**$188**
D-Link DSS-16 16 Port Switch 10/100MB Dual Speed	$353

SCSI Adapters

Adaptec PCI 2940 UW (Retail)	$165
Adaptec PCI [illegible] UW (OEM)	$325
Adaptec PCI [illegible] Dual SCSI II	$CALL
Adaptec PCI ARO 1130	$410
Adaptec PCI AAA135 16MB U2 Kit Raid (Cable, Software)	**$1068**
TekRam PCI [illegible] Ultra SCSI Card	$84
TekRam PCI [illegible] Ultra Wide / 390U2W Ultra2 Wide	$145 / 276

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INTEL CELERON 500MMX

- Elite P6SE1 MI DUAL, ATX AGP Video A3D Sound 56k & NIC
- 32MB PC100 SDRAM
- 6.4GB UDMA66 hard drive
- 3.5" 1.44MB floppy disk drive
- 8MB AGP IIM 3D Video Accelerator supporting full screen MPEG
- 15" ATX Mini tower case 230W
- 2B Mini Mouse & Pad
- 104 Win95 Keyboard
- 50X UDMA CD ROM Drive
- 100W Multimedia Speakers
- 56K V.90 Voice/FAX Modem
- 10/100 Mbps NetCard (@HOME /ADSL Ready)
- 2 Years Parts and 3 year Labour Warranty

(Monitor Extra) $599

HOME ENTERTAINMENT

INTEL CELERON 533MMX

- Microstar 6183Pro 440BX USB 128K
- 64MB PC100 SDRAM 128K
- Maxtor 15GB UDMA33 Hard Drive
- 3.5" 1.44MB Floppy Disk Drive
- Sniper2 TNT2 M64 32MB AGP W/DVD SW TV OUT
- 15" Monitor NI I.R. Digital Control 1280x1024 .28 dp PnP
- 18" Mid Tower case ATX 250W CSA
- Microsoft 3B IntelliMouse
- 104 Windows 95/98 Keyboard
- 8X DVD ROM Drive
- Acer AW37 3D SW Wavetable SA
- Juster 3D FX1 450W /Subwoofer
- 56K PCI Voice/FAX Modem
- 2 Years Parts and 3 year Labour Warranty

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CELERON II MACHINE

INTEL CELERON II 566A

- ASUS P3V4X PIII 300-750MHz VIA133A ATX
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- Fujitsu 17GB 5400RPM Hard Drive
- 3.5" 1.44MB Floppy Disk Drive
- 3DFX Voodoo III 3000 16MB w/ TV-Out
- Samsung 750s 17" Monitor .27mm
- BTC 104 Win95 Keyboard
- Logitech 2B PS/2 Mouse
- 18" Mid Tower Case ATX 250W CSA
- 56K PCI Voice/Fax Modem
- Aureal Vortex2 SuperQuad (Digital I/O) A3D
- Acer 52X CD ROM INT IDE
- Juster 3D FX1 450W /Subwoofer
- 2 Years Parts and 3 year Labour Warranty

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ATHLON MULTIMEDIA

AMD ATHLON 650

- Gigabyte 7IX Athlon 500 700MHz Slot A
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- Samsung 750s 17" Monitor .27mm
- IBM Multimedia Keyboard
- Logitech 2B Netmouse w/ Scrolling / PS/2
- 18" Mid Tower Case ATX 250W CSA
- 56K PCI Voice/Fax Modem
- 8X DVD ROM Drive
- Rock Live 200 Speaker System w/ Subwoofer
- Lexmark Z11 Color Jet Printer 1200DPI
- Acer 640U 600x1200 48bit USB Scanner
- Microsoft Windows98 SE OEM Full Version
- 2 Years Parts and 3 year Labour Warranty

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HOME & OFFICE PLUS

INTEL PENTIUM 667EB

- Microstar 6183Pro 440BX USB 512K
- 64MB PC133 SDRAM
- Maxtor 15GB 5400rpm Hard Drive
- 3.5" 1.44MB Floppy Disk Drive
- Arcade RIVA TNT2 M64 Video Card 32MB
- Samsung 750S 17" Monitor .27mm
- 18" Mid Tower case ATX 250W CSA
- Logitech 2B NetMouse w/scroll
- IBM Multimedia Keyboard PS/2
- Acer 52X UDMA CD-ROM Drive
- Acer AW230 PCI Crystal 3D Sound
- Acer PCI 56K V.90 Voice/Fax Int.
- Juster 3D FX1 450W /Subwoofer
- 2 Years Parts and 3 year Labour Warranty

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AMD ATHLON 850

- Abit KA7 KX133 ATX SLOT A UDMA66 4XAGP
- 128MB PC133 SDRAM
- Quantum LM 20GB 7200RPM Hard Drive
- 3.5" 1.44MB Floppy Disk Drive
- ASUS V6800 Geforce 256 Deluxe w/ TV OUT 3D Glasses & Asus Software
- Optiquest Q95 19" Monitor .23mm 1600x1200
- 18" Mid Tower case ATX 250W CSA
- Acer 56K v.90 Voice/Fax Modem
- Logitech 2B NetMouse w/scroll
- IBM Multimedia Keyboard PS/2
- Panasonic SR 8585 8X DVD Drive
- Sound Blaster live v2.0 Value w/ Digital Out
- Juster 3D-FX1 450W /Subwoofer
- 2 Years Parts and 3 year Labour Warranty

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AMD K6 II 550 MMX

- Microstar MS5169 ALI ATX 512k USB
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- 3DFX Voodoo II 2000 AGP 16MB
- 15" Monitor N.I. L.R. 1280x1024 .28mm
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- Logitech 2B PS/2 Mouse
- 104 Windows 98 Keyboard
- 8X DVD ROM w/SOFTWARE
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- 160W Multimedia Speakers
- 56K PCI Voice/FAX Modem
- 2 Years Parts and 3 year Labour Warranty

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GAME BUSTER

INTEL PENTIUM 667EB

- Microstar 6163Pro 440BX USB 512K
- 128MB PC133 SDRAM
- Maxtor 15GB 5400RPM Hard Drive
- 3.5" 1.44MB Floppy Disk Drive
- ASUS V6800 PURE Geforce 32MB DDR
- Optiquest Q95 19" Monitor .23dpi 1600x1280
- 17" Mid Tower case ATX 250W CSA
- Logitech 2B NetMouse PS/2
- 104 Windows 98 Keyboard
- Acer 50X UltraDMA CD-ROM Drive
- Aureal Vortex2 SuperQuad (Digital I/O) A3D 2.0
- Juster 3D FX1 450W /Subwoofer
- 56K PCI Voice/FAX Modem
- 2 Years Parts and 3 year Labour Warranty

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CPU

MHZ	400	533	500	566	600	650	700	733	750	800	850	900	950	1000
CELERON	$100	$100		$180										
PENTIUM III	$330	$330	$318		$300		$449	$630		$750				
AMD K6-2	$100	$130	$130											
AMD K7			$220		$262	$270	$310		$438	$558	$745	[illegible]	$1144	$2095

NOTEBOOKS

Manufacture	Model	CPU	MEM	HDD	CD	Display	Modem	Price
Compaq	[illegible]	K6-2 475	32MB	[illegible]	24X	12.1	56K	[illegible]
NEC	VERSA VX	C 500	64MB	6GB	24X	12.1 TFT	56X	$2596.00
Fujitsu	S-4510	PIII 400	64MB	6.4GB	24X	12.1	56X	$3402.57
HP	OB 900	PIII 400	64MB	6.4GB		12.1 TFT		$3402.87
Toshiba	3000CT	C 500	64MB	8GB	4X DVD	14.1 TFT	56K	$3330.52
Toshiba	8000	PIII 500	64MB	12GB	DVD	12.1 TFT		$5183.35

RAM

MEMORY TYPE	4MB	8MB	16MB	32MB	64MB	128MB	256MB
Regular 72-Pin Fast Page	$32	[illegible]	[illegible]	[illegible]			
EDO 72 Pin	$30	[illegible]	$178	$180			
SDRAM 168-Pin			[illegible]	[illegible]	[illegible]		
PC 100 SDRAM 168-Pin			$60	$89	$180	$549	
PC133 SDRAM 168-Pin				[illegible]	[illegible]	[illegible]	
ECC PC 100 SDRAM				$170	$270	$385	
Crucial PC133				[illegible]	[illegible]		
Corsair PC100 CAS2				$180	$500		

SYSTEM FAVORITE OPTIONS

Corel/Wordperfect Office 2000	$44.95
Window 98 SE Full Version	$138
Windows NT Workstation 4.0	$226
MS Home Bundle	[illegible]
Windows 2000 Pro/Server	[illegible]
Linux Redhat 6.1 / Open 2.2	$59/68

CONTROLLERS

ADAPTEC PCI SCSI 2940UW OEM/2940U2W OEM	$265/320
SIIG CYBER PCI ECP/EPP Printer Port	$69
TEKRAM PCI 390F UW/390U2W SCSI KIT	$133/270
TEKRAM PCI 310U PCI Fast SCSI	$80
PROMISE UDMA66 PCI w/Cable OEM	$44
PROMISE FASTTRAK66 IDE Raid Card	$212

NETWORK

3COM PCI Fast Link 10/100Base-T (OEM)	$78
10/100Mbps PCI D-Link 530TX / ACCTON 32	$28/26
ACER Combo ISA/PCI / ACER 8-Port Hub	[illegible]
INTEL Etherexpress Pro 10/100 PCI 32bit	$70
D-LINK 5/8 Port Mini Hub	[illegible]
LINKSYS 10/100 Auto-Sense 16 Port Hub	$100/272
SAMSUNG SmartEther 10/100 4	[illegible]
NETGEAR 10BT 8 Port	$41
D-LINK 10/100 4 Port PCI Network Starter Kit	[illegible]
D-LINK 10/100 8 Port Switch	$149
SURECOM 10/100 PCMCIA Ethernet Card	[illegible]

REMOVABLE

IOMEGA CLICK! 40MB Parallel Removable Drive	$270
Super Disk LS-120 120MB Floppy Drive Int	$200
IOMEGA ZIP Parallel/USB	[illegible]
IOMEGA ZIP 100 Int IDE	$91
IOMEGA ZIP 250MB IDE/Parallel/SCSI EXT/USB	$150/236/237/265
CASTLEWOOD ORB 2.2GB INT IDE/EXT Parallel	$273/301
CASTLEWOOD ORB 2.2GB Disk	[illegible]

MODEMS

ACER 56K Int. Voice SVD SPK V.90 ISA/PCI/EXT	$76/40/108
LUCENT 56K Int. Voice V.90 PCI	$37
DIAMOND PCI 56K SupraMax Voice Int. V.90	$58
THUNDERLINK 56K V.90 PCI Modem	$25
USR 56K Sportster 56K Voice Int/V.90	[illegible]
USR 56K V.90 Voice Fax Ext	[illegible]
USR 56K V.90 PNP Data/Fax/Voice	[illegible]
MOTOROLA 56K V.90 Data Fax/Voice PCI	$29
SURECOM v.90 PCMCIA Modem	[illegible]

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Fujitsu	13.6GB	8.5ms	7200	2MB	UDMA66	$185
Fujitsu	17.3GB	9ms	5400	512K	UDMA66	$170
Fujitsu	20GB	9.5ms	5400		UDMA66	$196
Western Digital	4.3GB	9.5ms	5400	512K	UDMA66	$130
Western Digital	8.4GB	9.5ms	5400	2MB	UDMA66	$160
Western Digital	10.2GB	9.5ms	5400	512K	UDMA66	$160
Western Digital	13GB	9.5ms	5400	2MB	UDMA66	$160
Western Digital	20.4GB	9ms	5400	2MB	UDMA66	$180
Western Digital	30GB	9ms	5400	2MB	UDMA66	$248
Quantum	8.4GB	9ms	7200	512K	KA UDMA66	$166
Quantum	10.2GB	9ms	5400	512K	CX UDMA66	$183
Quantum	20GB	9ms	5400	512K	CX UDMA66	$260
Quantum	13.6GB	8.5ms	7200	512K	KX UDMA66	$200
Quantum	10.2GB	8.5ms	7200	2MB	LM UDMA66	$178
Quantum	20GB	8.5ms	7200	2MB	LM UDMA66	$250
Quantum	30GB	8.5ms	7200	2MB	LM UDMA66	$300
IBM	20.5GB	9ms	7200	2MB	UDMA66	$250
IBM	30GB	8.5ms	7200	2MB	UDMA66	[illegible]
Maxtor	8.7GB	9ms	5400	512K	UDMA66	$166
Maxtor	10GB	9ms	5400	2MB	UDMA66	$153
Maxtor	13.6GB	9ms	7200	2MB	UDMA66	$199
Maxtor	13.6GB	9ms	5400	512K	UDMA66	$165
Maxtor	15GB	9ms	5400	512K	UDMA66	$176
Maxtor	20GB	9ms	7200	2MB	UDMA66	[illegible]
Maxtor	20GB	9.5ms	5400	512K	UDMA66	$199
Maxtor	30.7GB	9ms	7200	2MB	UDMA66	$300
Maxtor	40GB	9ms	7200	2MB	UDMA66	$389
Maxtor	61GB	9ms	5400	2MB	UDMA66	$440

IBM U2W	36.4GB	7.5ms	7200	4MB	Ultrastar36XP	$2180
Quantum U2W	9.1GB	6.9ms	7200	512K	Atlas IV	$374
Seagate U2W	50GB	9ms	7200	512K	Barracuda	$1960
Seagate U2W	9.1GB	8ms	7200	512K	Barracuda	$720
Seagate	18.1GB	5ms	10000	1MB	Cheetah	[illegible]

MOTHERBOARD

ABIT [illegible] 100 "NEW" ATX20 SLOT A [illegible]	[illegible]
ABIT [illegible] 500MHz [illegible]	$108/133
ABIT [illegible] 500MHz PC133 [illegible]	[illegible]
ABIT [illegible] 300 [illegible] VIA APOLLO PRO133A [illegible]	$137/157
[illegible]	[illegible]
AOPEN [illegible] 500MHz VIA APOLLO PRO 133A CHIPSET	$129
ASUS [illegible] SLOT A [illegible] "NEW"	[illegible]
ASUS [illegible] 500MHz [illegible]	$190
[illegible]	[illegible]
ASUS [illegible] ATX 300-800MHz NEW	$200
ASUS [illegible] VIA APOLLO PRO 133A CHIPSET "NEW"	$170
ASUS P5A SUPER 7 ATX w/SOUND [illegible] SOUND	$140/125
ASUS K7M ATHLON SLOT A UDMA66	[illegible]
GIGABYTE [illegible] 700MHz UDMA66	$138
GIGABYTE [illegible] UDMA66 VIA APOLLO PRO 133A CHIPSET	$150
INTEL [illegible] AUDIO	$183
INTEL [illegible] SOUND & VIDEO	[illegible]
[illegible]	[illegible]
MICROSTAR MS-6182 [illegible]	[illegible]
MICROSTAR [illegible] 133MHz VIA APOLLO PRO 133A CHIPSET	$120
MICROSTAR MS-6195 ATHLON SLOT A	$180
SUPERMICRO [illegible] AGP 100MHz APOLLO 133A	$214

SCANNER

Scanner	Model	Color	Resolution	Price
Agfa	1212P	36	600x1200	$122.00
Agfa	1236S	36	600x1200	$201.00
Artec	1235P	36	600x1200	$104.00
Artec	1236USB	36	600x1200	$105.00
Artec	AM12E Plus	36	600x1200	$30.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Genius	Color Page View	30	300x600	$104.00
HP	6100C	36	1200	$278.00
HP	4200CXE USB	36	1200	$207.00
HP	PhotoSmart	[illegible]	2400	$640.00
Canon	[illegible]30	30	1200x1200	$137.00
Canon	620P	36	2400x2400	$166.00
Umax	1220S	30	600x1200	$187.00
Umax	1220S	36	600x1200	$216.00

MULTIMEDIA

CREATIVE LABS 52X CD-ROM	$80
ACER 40X/48X/50X/52X CD ROM	[illegible]
TOSHIBA 24X IDE/40X IDE/40X SCSI	$75/88/148
CD ROM External Case Parallel Port to IDE	$75
DVD 8X IDE Bare Drive TOSHIBA/SONY	$200/170
DVD 10X PIONEER [illegible]	$195/210
DVD 8X IDE Bare Drive PANASONIC/HITACHI	$200/110
CREATIVE PC DVD 6X Encore Dxr2 Dolby AC-3	$341
Pioneer 10X DVD Slot/Tray Load	$210
[illegible] 40X CD ROM	$170

AUREAL [illegible] & Digital Out OEM	$74
AUREAL [illegible] PCI [illegible] Digital Out	$76
CREATIVE Sound Blaster 16PnP/Ensoniq PCI	$40/30
CREATIVE Sound Blaster PCI 128 [illegible]	$50/80
CREATIVE Sound Blaster Live Platinum/X Gamer/MP3+	$288/130/138
DIAMOND Sonic Impact PCI 3D Sound	$51
DIAMOND Monster Sound MX300	$114
ACER PCI Wavetable AWE [illegible] AW320	$21/28/34
LG MP3 Player 32MB	$186
DIAMOND Rio PMP300 MP3 Player 32MB	$263

ACER 8X/4X/32X CDRW Inc. IDE 4MB Buffer	$348
RICOH 8x/4x/32x Int. IDE	$280
PANASONIC 8x/4x/32x CDRW OEM	$290
CREATIVE CDRW 8424 Retail	$330
PLEXTOR 8x/4x/32x CDRW [illegible] w/ Sb Quicken OEM	$334
YAMAHA CRW8424E 8x/4x/24x Int. IDE OEM	[illegible]
NO NAME CDR 74Min	$2.49

ALTEC LANSING PowerCube ACS44/ACS48	$118/170
ALTEC LANSING PowerCube USB ADA70/ADA880 5 Piece	$132/340
CMT-5100A w/ Subwoofer	$88
CAMBRIDGE Soundworks Speakers	$157
CAMBRIDGE Desktop Theatre 5.1	$379
CAMBRIDGE Altec FPS1000 FPS2000	$109/220
YAMAHA M8/M15/M20/M528 Speakers	[illegible]

MONITOR

Monitor	Size	Model	DPI	Resolution	Price
Aoc	19"	G772	0.26	1280x1024	$318.00
ADI	17	5G	0.26	1600x1280	$452.00
ADI	19	G66	0.26	1600x1280	$638.00
Impression	17"	8 Plus	0.28	1280x1024	$182.00
Impression	19"	7/9 Plus	0.28	1280x1024	[illegible]
LG	17	795FT+	0.24	1600x1200	$440.00
LG	19	995E	0.26	1600x1200	$538.00
NEC	[illegible]	A700	0.27	[illegible]	[illegible]
NEC	[illegible]	FE700	[illegible]	[illegible]	[illegible]
Panasonic	17"	E70	0.27	1280x1024	$329.00
Panasonic	17	SL70i	0.27	1280x1024	$421.00
Panasonic	17	SL75	0.27	1280x1024	$455.00
Proview	17"	[illegible]	0.27	1280x1024	$200.00
Proview	17"	[illegible]	0.26	1280x1024	$230.00
Proview	19"	[illegible]	0.26	1600x1200	$400.00
Samsung	17	750S	0.28	1280x1024	$269.00
Samsung	17	700NF	0.25	1600x1200	$440.00
Samsung	17	753DF	0.20	1280x1024	$349.00
Samsung	19"	900NF	0.22	1600x1200	$708.00
Samsung	19"	[illegible]	0.26	1600x1200	[illegible]
[illegible]	19"	[illegible]	0.28	1600x1200	$530.00
Sony	15	110GS	0.25	1280x1024	$372.00
Sony	17	210GS	0.25	1280x1024	$499.00
Optiquest	17"	Q71	0.28	1280x1024	$300.00
Optiquest	17"	V75	0.26	1600x1200	$466.00
Optiquest	19"	[illegible]	0.26	1600x1200	$727.00
Viewsonic	17	EF70	0.25	1280x1024	$402.00
Viewsonic	17	E771	0.27	1280x1024	$330.00
Viewsonic	17	E773	0.25	1280x1024	$370.00
Viewsonic	17	G773	0.26	1280x1024	$417.00
Viewsonic	17	PS775	0.25	1600x1200	$518.00
Viewsonic	19"	PS790	0.25	1600x1200	$700.00
Viewsonic	19"	PF790	0.25	1600x1200	$689.00

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ARCADE RIVA TNT2 M64 / TNT2 ULTRA 32MB 4X AGP TV-OUT	$110/197
ASUS 7700 GEFORCE 2 GTS 32MB DDR "NEW"	$489.50
ASUS V6800 GEFORCE 32MB DDR Pure/Deluxe	$300/352
ASUS V6600 GEFORCE [illegible] Software	$314
ASUS V3800 TNT2 32MB TV-Out Pure/Deluxe	$242/300
ATI [illegible] 32MB PCI AGP 128 PRO 32MB	[illegible]
ATI AGP 16MB XPERT 128/XPERT 2000 OEM	$115/120
ATI RAGE Fury 32MB AGP OEM TV Wonder PCI Retail	$170/115
ATI RAGE FURY MAXX 2X/4X AGP 64MB OEM	$258
CREATIVE 3D Blaster Annihilator PRO DDR 32MB GeForce	$390
CREATIVE Savage4 32MB PCI/AGP Retail	$142/112
CREATIVE TNT2 32MB AGP Ultra	$272
DIAMOND Viper II 2x/4x AGP 32MB Retail	$271
[illegible]	[illegible]
GUILLEMOT Xentor TNT2 32MB Ultra	$275
LEADTEK WINFAST GEFORCE 2 GTS 32MB DDR NEW	$500
MATROX G400 AGP OEM 16MB / 32MB	$139/160
MATROX G400 AGP 32MB DUALHEAD OEM/RETAIL/MAX	$245/259/290
PowerColor Sniper TNT2 M64 32MB /TV-Out	$131/134
S3 [illegible] 4MB AGP	$40
VOODOO3 AGP OEM 2000/3000 TV OUT/3500 TV OUT	$125/190/318

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Brand	Model	Resolution	PPM	Price
Brother	HL1040	600DPI	10	$365.00
Brother	HL1040DL	600DPI	13	$429.00
Brother	HL1050DX USB	1200DPI	10	$533.00
Brother	1660E	1200DPI	17	$1,256.00
Brother	HL1270N	1200DPI	12	$640.00
Canon	BJC 1000B	720x360	4/1	$100.00
Canon	BJC 2000	720x360	5/2	$121.00
Canon	BJC 80	360x360	4.5/2	$317.00
Canon	BJC 7000	1200x600	5/3.5	$500.00
Epson	Stylus 440	720x720	[illegible]	$154.00
Epson	Stylus 660	1440x720	6	$198.00
Epson	Stylus 740	1440x720	7	$250.00
Epson	Stylus 900	1440x720	10	$565.00
Epson	Photo 780	1440x720	7	$384.00
Epson	Photo [illegible]	1440x720	7	$610.00
HP	810C	600x600	4	$154.00
HP	840C	1200x600	8/5	$220.05
HP	880C USB	600x600	8/5	$380.00
HP	930C	2400x1200	9/7.5	$306.36
HP	1100XI	600x600	8	$587.50
Lexmark	Z11	1200	4/2.5	$148.00
Lexmark	Z31	1200x1200	8/3.5	$174.00
Lexmark	Jet 1100	600x600	3.5	$146.00
Lexmark	Jet 3200	1200x1200	8	[illegible]
Lexmark	Jet 5770 Photo	1200x1200	8	$341.00
Lexmark	Optra E+	600x600	8	$485.00
Lexmark	Optra E310	600x600	8	$575.00
Samsung	L 5100A	1200DPI	8	$328.00
Samsung	1-6050	1200DPI	12	$460.00
Okidata	10EX	1200DPI	10	$460.00
Okidata	6W	600DPI	6	$306.00
Okidata	4W	600DPI	5	$238.00

ACCESSORIES

15"/19"/24" AT Tower Case	$45/55/85
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[illegible] 21" ATX Tool Free 250W w/1 Extra Fan	$149
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SUPERMICRO SC-750A PC/2.01 Compliant	$208
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SOCKET 370 TO SLOT 1 Converter MSI	[illegible]
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TP390X	PIII450	64MB	12G	24x	56K	14.1TFT	$3,888
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NEC 17" FE700, .25mm	$386
Samsung 15" 550S, .28mm	$199
Samsung 17" 750S, .27mm	$265
Samsung 17" 753DF 20mm	$359
Samsung 15" 750B LCD	$1250
Sony G200 17" .25mm	$599
Sony G400 19" 25mm	$849
Viewsonic 17" E771 .27mm	$309
Viewsonic 17" EF70 .25mm	$388
Viewsonic 17" M70 .27mm	$399
Viewsonic 17" PS775 22mm	$485
Viewsonic 17" PF 775 25mm	$485
Viewsonic 19" E790 .26mm	$496
Viewsonic PF790 25mm	$680
Viewsonic 19" PS790 25mm	$690

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Acer 620P	$99
Acer 320U / 640U	$115/120
Canon 630U	$179
HP 3300C / 5200C	$175/339
HP 5300U / 6390U	$339/1149

Hard Drive

Fujitsu 6.4GB Ultra DMA	$129
Fujitsu 10GB Ultra DMA	$145
Fujitsu 20GB Ultra DMA	$189
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Maxtor 20G 7200rpm	$245
Maxtor 30G 7200rpm	$309
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Quantum 20GB LM 7200rpm	$249
Quantum 30GB LM 7200rpm	$349
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HP 4050TN Laser Printer	$2299
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Asus V6600 GeForce, 64MB	$335
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Matrox G400 D/H 32MB	$235
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3Dfx Voodoo3 3500 AGP 16MB	$255

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SB comp Sound card PCI	$22
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Altec Lansing ACS45.2	$90
Creative 4 point speaker	$109

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Acer 56k V90 Int Voice/Fax	$45
USR 56K PCI Voice V90 (Win)	$59
USR 56K Int. Voice V90	$99
USR 56K Ext. Fax V90	$179

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ABIT VA6 w/ Audio	$135
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ASUS P3V4X VIA	$169

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Viewsonic 19" PF790 25mm Monitor	$680
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HP 840 Color Printer	$236
HP 970C Color Printer	$549
Canon 630U Color Scanner	$179
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The ergonomics of IT

Continued from page 22

Association's computer committee. "Making sure the height of the keyboard above the floor and the height of the seat you're sitting on above the floor are both optimal is a good place to begin.

Second, the individual sitting at the keyboard should be in good physical shape," Phillips adds. "If they tend to be a very tense individual whose lifestyle doesn't include regular physical activity, the literature is substantial that suggests that type of individual is more likely to develop the syndrome. On the other hand, it's very rare in my experience to come across a patient who does a regular cardiovascular fitness program or some kind of good regular exercise who develops these kinds of disorders."

A common risk factor is when people use standard desks, rather than desks designed to accommodate a computer, which puts their arms and elbows higher than they should be when using a keyboard.

But Phillips' solution looks to a person's overall fitness. "If I can trigger some interest in adopting a pro-active, self-help program that involves some sort of regular exercise that's pleasurable to them, that will usually have much more effect than going out and buying different equipment."

> If I can trigger some interest in adopting a pro-active, self-help program that involves some sort of regular exercise that's pleasurable to them, that will usually have much more effect than going out and buying different equipment.
>
> *—Dr. Keith Phillips, B.C. Medical Association's computer committee*

Phillips is convinced that there's rarely a single, simple solution to syndromes resulting from poor ergonomics. Anderson, Goyert and Phillips all agree that you not only have to look at the setup of the desk, chair, keyboard, mouse and monitor, you also have to consider what you're doing when you're not working.

All support taking time out to stretch periodically when working at a computer for long periods. "Usually I give patients a little chart of neck and upper torso exercises," says Phillips. "And if they can do that in their workplaces that's all the better."

In summing up his advice, Phillips essentially recommends that we all keep moving. "We are a very sedentary nation, to the point that suggesting activity is a revolutionary idea to some. But we can't underestimate lifestyle's impact on keeping people healthy and avoiding these kinds of problems. The human organism is meant to be used and we often forget that in our complex technological environment." ❑

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- Win98 Keyboard 2 B Mouse/pad
- 140W Speaker
- 15" SVGA Monitor +$175
- AMD K6 II CPU

K6-2 500MHz $499
K6-2 533MHz $510
K6-2 550MHz $528

Intel Power Station

- Elite P6set AGP Motherboard
- 17" ATX Case 250W P/S
- 64MB PC100 SDRAM
- 1.44 Floppy Drive
- Fujitsu 6.4GB HD
- SIS SVGA 8M AGP O/B
- PCI 16Bit Soundcard O/B
- 48X EIDE CDROM
- 56K V90 Modem O/B
- 140W Speaker
- Win98 PS/2 Keyboard & Mouse
- Intel Celeron CPU
- 15" No-Int. Low Rad Monitor +$175

Celeron 400MHz $546
Celeron 466MHz $589
Celeron 533MHz $809

Intel Professional Station

- Elite PIII B 133MHz Motherboard
- 17" ATX Case 250W P/S
- 64MB PC133 SDRAM
- Panasonic 1.44 Floppy Drive
- Fujitsu 13GB HD
- RIVA TNT2 32MB
- Creative Ensoniq 128 Sound card
- Creative 52X EIDE CDROM
- 56K V90 Modem ESS
- Juster 3D 300W Spkr /w subwoofer
- 17" N-I SVGA AOC .28 Monitor
- Win98 PS/2 Keyboard & Mouse
- Intel CPU

P-III 533MHz $1239
P-III 600MHz $1279
P-III 733MHz $1389

AMD Athlon K7 Superior Station

- Gigabyte 7VG Motherboard
- 128MB 168pin SDRAM
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- 15GB DMA66 7200rpm HD
- 2 USB port
- AGP TNT2 32MB VGA
- Sound Blaster Life Value
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- 50X CDROM
- 17" .27 N-I SVGA Monitor
- ATX Case 250W power supply
- 107 keys Win98 KB PS2 Mouse

K7 550MHz $1399
K7 700MHz $1439
K7 800MHz $1699
K7 900MHz $2000
K7 1000MHz $3009

Intel Premium System

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- 17" ATX Case 250W P/S
- 64MB PC133 SDRAM
- 1.44 Panasonic Floppy Drive
- Fujitsu ATA66 20GB HD
- Asus TNT2 3800 32MB
- SB Live Value Card
- Creative 52X CDROM
- AOpen V90 56K PCI Modem
- Juster 450W Spkr/Subwoofer
- 17" SVGA .25 AOC Monitor
- Win98 PS/2 Keyboard & Wheel Mouse
- Intel Pentium III CPU

PIII 533MHz $1369
PIII 600MHz $1399
PIII 700MHz $1533
PIII 733MHz $1553

Intel Game Blaster

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- 20GB 7200rmp ATA66 HD
- Creative 52X CDROM Drive
- 1.44 Panasonic Floppy Drive
- Asus TNT2 3800 32MB
- Creative SB Live Value Card
- Cambridge PC Work Subwoofer
- USB 3 Com 56K V90 Modem
- MS Internet Keyboard
- MS Intellige Explorer Mouse
- Viewsonic E773 17" dp .25 Monitor

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Asus PIII B-F / C2000 133MHz	$179/230
Asus P3 133Vx4/K7M/K7V	$175/199/225
Gigabyte BX 2000	$155
Gigabyte 5 Socket7 5SMM Ultra 66	$119
Gigabyte GA 6VX-4X/GA 7VM	$143/166
Intel T440BX / C820	$179/205
Elite PIII B 133MHz / ATA Ultra 66	$119

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32 / 64 MB PC100 144pin	$59/128

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SCSI Toshiba 40X	$112
DVD	
Hitachi 8X / **Pioneer** 10X	$189/219
Creative 5X	$159
Hollywood Decode Card	$119
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Creative 4416/6424/8432	$269/289/319
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BP 8250/8432/9310	$269/309/389
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Fujitsu 8725/ 4775 Keyboard	$19/59
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MS Traker/Intellige Explorer Mouse	$12/21
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CPU

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AMD K7 550 / 800	$229/269
AMD K7 650/700/800	$275/309/455
Intel Celeron 366 / 400	$89/128
Intel Celeron 466/500/533	$149/159/168
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MMX 233	$79

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NEC M500	$399
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ATI All-in-W Pro AGP 8/16/32MB	$159/233/279
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Creative GeForce pro/ II 64MB	$393/450
Matrox Millenium G400 16 / 32MB	$159/199
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Matrox Millenium G400 Max 32MB	$252
RIVA TNT2 III / 32MB / Pro	$99/109/139
SIS 6236 8MB AGP / SIS 4MB	$50/39
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Brother 1030/1040DX/1250DX	$379/429/540
Canon 2000 / BJC 1000($20 rebate)	$139/99
Canon BJC 5100 / 6100	$179/325
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Epson 600/850/900/860	$359/420/628/382
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Soundblaster 16bit ISA	$38
Soundblaster PCI 128 / Ensonic	$49/32
Soundblaster Live Value/ 512Bit	$75/73
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Diamond MX400	$82

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A-Open PS/2 Mouse w/Pad	A-Open PS/2 Mouse w/Pad	A-Open PS/2 Mouse w/Pad	A-Open PS/2 Mouse w/Pad	Microsoft PS/2 IntelliMouse
MS Windows '98 SE CD	MS Windows '98 SE CD	MS Windows '98 SE CD	MS Windows 98 SE CD	MS Windows '98 SE CD
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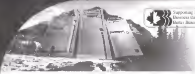

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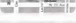

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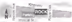

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ATI 64MB Fury Max AGP4X Video Card	$238.00	SNP [illegible] 32M NVIDIA RIVA TNT2 M64 4X8X AGP$160.00	$160.00
ATI 8MB SRAM Xpert98 AGP Video Card	$80.00		

Sound Card

SoundBlaster 3D Blaster Annihilator Sound Card	$320.00
SoundBlaster Ensoniq PCI Sound Card	$60.00
SoundBlaster Live MP3+ Sound Card Retail	$130.00
SoundBlaster Live Platinum Sound Card	$230.00
SoundBlaster Live X-GAME Sound Card	$130.00
SoundBlaster Live Value Sound Card	$80.00
SoundBlaster PCI 128 Sound Card	$46.00

Monitor

Acer 17" 77C SVGA Color Monitor	$275.00	Optiquest 17" Q71 SVGA Color Monitor	$300.00
Acer 17" G77F SVGA Color Monitor	$316.00	Optiquest 17" V73 SVGA Color Monitor	$340.00
Acer 19" 99SL SVGA Color Monitor	$345.00	Optiquest 17" V75 SVGA Color Monitor	$360.00
ADC 15" SVGA Digital Color Monitor	$179.00	Optiquest 19" Q95 SVGA Color Monitor	$480.00
ADC 17" SVGA Digital Color Monitor (.26mm)	$264.00	Panasonic 21" S110 SVGA Color Monitor	$1,075.00
ADC 17" SVGA Digital Color Monitor (.28mm)	$258.00	Proview 19" SVGA Color Monitor	$418.00
Hansol 17" 710D 1280x1280 0.25 SVGA Color Monitor	$288.00	SONY 15" E100 SVGA Color Monitor	$300.00
Hansol 17" 710P 1600x1200 0.25 SVGA Color Monitor	$300.00	SONY 17" E200 SVGA Color Monitor	$510.00
Hansol 19" 900P 0.26 SVGA Color Monitor	$480.00	SONY 17" G200 SVGA Color Monitor	$575.00
MAG 15" SVGA Digital Color Monitor	$200.00	SONY 19" E400 SVGA Color Monitor	$734.00
MAG 17" 786FD SVGA Color Monitor	$440.00	SONY 19" G400 SVGA Color Monitor	$830.00
MAG 17" 796FD SVGA Color Monitor	$460.00	SONY 21" E500 SVGA Color Monitor	$1,400.00
MAG 17" XJ700 SVGA Color Monitor	$415.00	SONY 21" G500 SVGA Color Monitor	$1,600.00
MAG 19" 810FD SVGA Color Monitor	$730.00	Viewsonic 17" E771 SVGA Color Monitor	$310.00
MAG 19" XJ800 SVGA Color Monitor	$618.00	Viewsonic 17" EF70 SVGA Color monitor	$300.00
MAG 21" XJ910 SVGA Color Monitor	$1,140.00	Viewsonic 17" EF775 SVGA Color Monitor	$400.00
NEC 17" A700 SVGA Color Monitor	$295.00	Viewsonic 17" G773 SVGA Color Monitor	$418.00
NEC 17" FE700 SVGA Color Monitor	$370.00	Viewsonic 19" PF790 SVGA Color Monitor	$870.00
NEC 17" FE750 SVGA Color Monitor	$448.00	Viewsonic 21" P810 SVGA Color Monitor	$1,110.00
NEC 19" FE950 SVGA Color Monitor	$1,300.00	Viewsonic 21" P815 SVGA Color Monitor	$1,240.00
NEC [illegible] SVGA Color Monitor	$198.00	Viewsonic [illegible] PF815 SVGA Color Monitor	$1,300.00

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Fujitsu 4725 P/S2 Keyboard	$65.00
Fujitsu 4725 Win'95 P/S2 Keyboard	$18.00
Logitech Cordless iTouch P/S2 Keyboard w/Mouse & Pad	$119.00
Logitech Cordless Pro iTouch P/S2 Keyboard w/Mouse/Pad	$150.00
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Logitech Deluxe P/S2 Keyboard New Touch Edge	$46.00
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MS Natural Elite Keyboard P/S2	$36.00

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Logitech MouseMan Wheel USB Combo	$40.00
Logitech Trackman Marble Wheel USB	$70.00
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MS Optical Intellimouse Wheel P/S2 Mouse	$80.00
MS Trakker Wheel Mouse P/S2	$18.00
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Wacom Intuos Drawing Tablet 6x8	$440.00
Wacom Intuos Drawing Tablet 9x12	$618.00

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Creative Labs 52x IDE CD ROM Drive	$68.00
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Toshiba 4x SCSI CD ROM Drive	$120.00
[illegible] 12x48x IDE CD ROM Drive	$80.00

D V D

Afreey [illegible] IDE DVD Drive	$100.00
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Panasonic 8X DVD Drive	$180.00
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[illegible] Hard Drive	$185.00	Quantum 10.2GB FB+ LM ATA-66 7200rpm/8.5ms/2MB Hard Drive	$195.00
[illegible] Hard Drive	$196.00	Quantum 15GB FB+ LM ATA-66 7200 8.5ms/512K Hard Drive	[illegible]
[illegible] Hard Drive	$206.00	Quantum 20.4GB FB+ LM ATA-66 7200rpm/8.5ms/2MB Hard Drive	[illegible]
[illegible] Hard Drive	$110.00	Quantum 30GB FB+ LM ATA-66 7200rpm/8.5ms/2MB Hard Drive	$306.00
[illegible] Hard Drive	$195.00	WD 10.2GB IDE-ATA66 5400rpm/9.5ms/2MB Hard Drive	$180.00
Maxtor [illegible] Hard Drive	$186.00	WD 15.3GB IDE-ATA66 7200rpm/9ms/2MB Hard Drive	$206.00
Maxtor [illegible] Hard Drive	$190.00	WD 20.5GB IDE-ATA66 5400rpm/9.5ms/2MB Hard Drive	$210.00
Maxtor [illegible] Hard Drive	$200.00	WD 20.5GB IDE-ATA66 7200rpm/9ms/2MB Hard Drive	$240.00
Maxtor 20.4GB [illegible] Hard Drive	$300.00	WD 30.7GB IDE ATA66 5400rpm/9.5ms/2MB Hard Drive	$306.00
Maxtor [illegible] Hard Drive	$301.00	WD 8.4GB IDE ATA66 5400rpm/9.5ms/2MB Hard Drive	$180.00
Maxtor [illegible] Hard Drive	$306.00	WD 8.4GB IDE ATA66 5400rpm/9.5ms/2MB Hard Drive	$130.00
Maxtor [illegible] Hard Drive	$415.00		

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[illegible] U2W 7200rpm/7.5ms/2MB Hard Drive	$300.00
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[illegible] Hard Drive	$300.00
[illegible] Hard Drive (10.0GB)	$300.00
[illegible] 7200rpm/8ms/2MB UW SCSI Hard Drive	$480.00
[illegible] 7200rpm/6.3ms/2MB U2W SCSI Hard Drive	$320.00
[illegible] 7200rpm/7.5ms/1MB Ultra SCSI Hard Drive	$345.00
[illegible] 7200rpm/7.5ms/2MB U2W SCSI Hard Drive	$304.00
[illegible] U2W SCSI Hard Drive	$300.00
[illegible] SCSI Hard Drive	$1,400.00
[illegible] SCA2 10Krpm/2MB Hard Drive	$718.00
[illegible] U2W 10Krpm/2MB Hard Drive	$700.00
[illegible] SCA2 10Krpm/7.8ms/2MB Hard Drive	$711.00
WD [illegible] U2W 10Krpm/2MB Hard Drive	$710.00
WD [illegible] U2W 10Krpm/2MB Hard Drive	$400.00
WD [illegible] U2W 10Krpm/2MB Hard Drive	$400.00
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Panasonic CW7585 (8x4x32) CD-ReWrite Drive	$219.00
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Samsung 6x4x24 CDRW Int IDE CD Write	$180.00
SONY 16X4X32 CDRW Int (IDE Bare Drive with software)	$350.00
SONY 8X4X32 CDRW Int (IDE Bare Drive(with software))	$276.00
Yamaha CRW8424 E IDE Int 8X/4X/24 CDR Write w/Kit	$418.00
Yamaha CRW8424 E IDE Int 8X/4X/24 CDR Write	$306.00
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Elite FC-PGA/Socket 370 Motherboard ATX
32MB PC100 SDRAM
Panasonic 1.44MB 3 1/2" Floppy Drive
6.4GB IDE ATA66 5400rpm Hard Drive
8MB 530 Chipset Integrated AGP Video
18" AT/ATX Tower Case/250W Power Supply
104 Win98 P/S2 Keyboard
Logitech 2 Button P/S2 Mouse
56K V.90 Integrated Voice Fax/Modem
16Bit 3D Integrated Sound w/ Wavetable
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120W Stereo Speakers
One Month Internet Free
Full warranty

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10GB IDE ATA66 5400rpm Hard Drive
32MB AGP Video Card
18" AT/ATX Tower Case/250W Power Supply
104 Win98 P/S2 Keyboard
Logitech 2 Button Mouse P/S2
56K V.90 Int. True PCI Voice/Fax Modem Card
SoundBlaster Ensoniq PCI Sound Card
52X IDE CD-ROM DIRVE
Juster 3D-FX1 450 Watt w/Subwoofer Speakers
PCWorks 2000 Plus Software Bundle
One Month Internet Free
Full warranty

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$989

ROCK SERVER #1

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128MB PC100 ECC SDRAM
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Integrade single-channel ultra-SCSI Controller
Quantum 9.1GB Atlas 7200rpm/6.9ms/2MB U2W SCSI Hard Drive
Intel 2MB SGRAM PCI Integrade Video
Net Server Case with 300W Power Supply
(Dimension 14.8w X 20.4d X 18.4h)
(Bay 2x3 1/2" exposed 4x3 1/2" Hidden 6x5 1/4 exposed)
Toshiba 48x Int. SCSI CD ROM Drive
Intel EtherExpress Pro/100+ On-Board Networking Lan
One Month Internet Free
Full warranty

$1,998

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ASUS P3V-4X Pentium-III Motherboard ATX
64MB PC133 SDRAM
Panasonic 1.44MB 3 1/2" Floppy Drive
Maxtor 20.4GB IDE ATA66
7200rpm/9ms/2MB Hard Drive
ATI 32MB Fury Rage128 Pro 4xAGP Video Card
18" AT/ATX Tower Case/250W Power Supply
104 Win98 P/S2 Keyboard
Logitech 2 Button Mouse P/S2
56K V.90 Int. True PCI Voice/Fax Modem Card
SoundBlaster PCI 128 Sound Card
Creative Labs 52x IDE CD ROM Drive
Juster 3D-105 Subwoofer Speakers
PCWorks 2000 Plus Software Bundle
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Full warranty

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Maxtor 30GB IDE-ATA66 7200rpm/9ms/2MB Hard Drive
Matrox 32MB Millennium G400
SingHead Head Video Card
17" A500 ATX Tower Case/230W Power Supply
MS Internet P/S2 Keyboard
MS Intellimouse Wheel P/S2 Mouse
56K V.90 Int. True PCI Voice/Fax Modem Card
Altec Lansing ADA70 USB True Digital Speakers
10X Int. IDE DVD Drive
PC Works 2000 Plus Software Bundle
One Month Internet Free
Full Warranty

NEC 17" FE700 SVGA Color Monitor **$385** Special price only for this system

$1,698

ROCK SERVER #2

Intel Pentium III 600EMHz CPU & Fan
Intel L440GXC Dual SCSI U2W Server Motherboard
(Dual Processors & Raid Capable)
128MB 168pin PC100 ECC SDRAM
Panasonic 1.44MB 3 1/2" Floppy Drive
[illegible]
Quantum 18.2GB Atlas 10K/5ms/2MB U2W SCSI Hard Drive
Intel 2MB SGRAM PCI Integrade Video
Net Server Case
(Dimension 14.8w X 20.4d X 18.4h)
(Bay 2x3 1/2" exposed; 4x3 1/2", Hidden: 6x5 1/4 exposed)
300W Redundant ATX Power Supply
USR 56K V.90 Internal ISA Voice/Fax Modem
Toshiba 40x SCSI CD ROM Drive
Intel EtherExpress Pro/100+
On-Board Networking Lan
One Month Internet Free
Full warranty

$3,345

Printer

[illegible]

Scanner

[illegible]

Network Card

[illegible]

PCMCIA Card

[illegible]

Controller Card

[illegible]

Fax/Modem

[illegible]

Hub Repeater

[illegible]

Optical Drive

[illegible]

Camcorder

[illegible]

Speakers

Altec Lansing ACS22 Speakers	$48.00
Altec Lansing ACS33 Speakers	$85.00
Altec Lansing ACS45.2 Speakers	$88.00
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Yamaha YST M8 Speakers	$48.00

NoteBook

[illegible]

Tape Drive

[illegible]

Photo album software, take three

With the proliferation of images used in Web sites and generated by digital cameras, one would think that a clear winner would emerge in the digital photo album market by now. In our third look at this software category, we find packages that come very close to fulfilling our wish list.

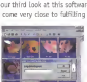
By Jacques Surveyer

Perhaps users are just as frustrated as this reviewer was the first time we evaluated photo album software. At that time, all of the products matched some of our needs but each was missing a key feature, such as the ability to process more than 30 images per second, support for other media files such as sound, animation and video, filters to search for files using keywords and/or default specs, or the ability to drag and drop files from the album for use in other programs.

We last looked at this software category in February (see "Cataloguing your digital images"). This time around we will see four unique approaches to solving these problems.

Jasc Media Center Plus 3.0

From: Jasc Software Inc.
7905 Fuller Rd., Eden Prairie, MN 55344 213
http://www.jasc.com
Street price: $45
Pros: Meets all our requirements and adds the ability to create many albums spanning diverse directories of images
Cons: Minor convenience features
Out of the box: Good quality manuals typical of Jasc products plus robust GUI, ease of use and ability to customize.
Overall rating: 4.4 out of 5



Media Center has a good pedigree. Jasc's Paint Shop Pro has had a photo album routine built into it for several versions. Like Media Center, the photo album program built into Paint Shop Pro handles most popular image types (over 30) and is fairly fast. However, Media Center is even faster, processing more than 400 images per minute. Also, Media Center handles many more media types—animation, video, audio and other multimedia files as well as image files.

Media Center allows the user to add comments and keyword fields to each file contained in the album. Keywords can be used to later look up and find all of the files with specific keyword(s). Finally, Media Center allows users to add comments to any file.

Creating a new album is very easy. Media Center prompts for an album name and asks how you want to populate it. There are four options: by scanning a specified directory (and all sub-directories if requested) for all media files, by browsing and selecting files, by copying selected files from an existing album, or by reading directly from a scanner or digital camera. In short, the process is easy and, as noted, very quick. Albums can be merged, printed in thumbnail format, and made into slideshows. The slideshows can be saved in HTML format for convenient Internet browsing.

Finally, right clicking the mouse on any album presents the user with the following set of options: Media File Info, Print, Play/View, Comments, Keywords, Edit with Cut, Copy, Convert (from one media format to another), Delete from album (but retain original file), Rename and Rotate.

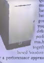
On the downside, Media Center lacks some convenience features like the ability to automatically load file properties such as the type or extension of the file or its size in kilobytes. Also there is no scripting language to batch up operations on albums.

PhotoRecall Deluxe 3.0

From: G&A Imaging Software Inc.
Tel: 819-772-7610 http://www.photorecall.com
Street price: $5
Pros: Does a great job of creating photo albums and shows

Continued on page 42

Monsoon blows a 950 MHz storm



At 950 MHz, the Voodoo Monsoon isn't quite the 1 GHz machine that we've been holding our breaths for, but it's pretty close and, as you'd expect, it delivers blistering performance. The machine was put together by Calgary-based Voodoo Computers Ltd. for a performance appraisal by TCP's Test Lab.

Voodoo Monsoon
From: Voodoo Computers
Tel: 403-264-4530 http://www.voodoo.ca
Price: $3,799 (without monitor)

The 950 MHz processor is one of the new AMD Athlon chips, and is paired up with the Apollo VX133 chipset with the front-side bus running at 200 MHz. Our test machine came with 256 MB of PC133 SDRAM. The system ships with a spacious 40.9 GB Maxtor DiamondMax hard drive, which spins up to 7,200 rpm and makes use of the UDMA66 interface for faster data transfer.

On the multimedia side, the machine is packed full of goodies. The graphics card is a 32 MB Guillemot 3D Prophet which uses the GeForce256 processor and double-speed DDR memory. Sound is courtesy of Creative's Sound Blaster Live! Value edition, coupled with a set of Cambridge SoundWorks FPS2000 Digital four-point surround speakers. The system we tested came with a 10x Pioneer DVD, but a 16x version should be dropped into shipping machines as soon as it becomes available.

For communication, the Monsoon comes with a 56Kbps Supramax v.90 modem from Diamond. For basic input, the mouse and keyboard are anything but

Continued on page 44

Vopt99 a fast disk defragmenter

By Chris Mellon

Windows 95 and 98 come with the DOS program Defrag.exe, which is a subset of the Speed Disk program in Norton Utilities. When I use Windows Defrag, I click the Details button to see a graphical representation of what is happening. Sometimes Defrag works quickly, moving multiple clusters of data at once. Other times it laboriously moves clusters individually, even if I've defragmented very recently! When it does this, defragmenting a partition of only a couple of gigabytes becomes painfully slow.

Vopt95 for Windows (95/98) 4.1

Publisher: Golden Bow Systems
Tel: 800-284-3269 http://www.goldenbow.com
Price: US$40 (single user), US$150 (five users), US$240 (10 users), US$500 (25 users)
Other versions: VoptNT (for Windows NT, defragments NTFS and FAT partitions), Vopt for DOS and Windows 3.1 (for DOS, Windows 3.1/3.11)

As CPUs, RAM, and motherboards become faster, and hard disks bigger, fragmentation of files becomes a greater bottleneck to computer performance. However, many computer users seldom defragment their hard disks. This is probably because they don't understand the benefits of defragmentation, and because—even if they do—it takes so long.

I first heard about Vopt99 when reading Scott Mueller's *Upgrading and Repairing PCs, Eighth Edition*. In it, Mueller says: "My favourite for an extremely safe, easy and fast unfragmenting program is the Vopt utility by Golden Bow. In my opinion, no other utility even comes close to this amazing $50 package."

With that kind of recommendation, I had to try it. Here are my observations on using Vopt99 with Windows 98.

Installation

Vopt99 is not sold in stores, which is probably why I had never heard of it. You can download a trial version of the program—a 1,917 KB self-extracting compressed file, that is easy to install—from the Golden Bow Web site and use it for 30 days. If you decide to buy it, you purchase a key (registration number) from Golden Bow, which enables you to use the program beyond the trial period.

User interface

Vopt uses the Windows graphical user interface (GUI) and pull down menus. There is no written documentation for the program, but good online help is provided. It has a Contents and Index and allows you

Continued on page 48

TCP Test Lab views the latest flat-panel monitors

page 62

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- 4 Speakers w / Subwoofer
- 56k int. voice fax modem v.90
  ATI Xpert'2000 AGP 32MB
- 18" ATX Case with 250W
- Fujitsu 8725 PS2 keyboard
- Logitech mouse w / pad
- Windows'98 ver.2 w/cd

$1400
for Intel PIII-650

$1480
for Intel PIII -700

$1180
for Celeron -500

Optional. *(w/system only)*

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Canon BJC 2100C Printer	+$140
15" 17" SVGA 1280 .27	+$180/350
NEC 17" AS70 / FE750 .25 Flat	$280/300
Viewsonic E70 17" .25 flat	+$310
Viewsonic E790 / PF790	+$520/680
Samsung 900NF / 700IFT PF950	+$650/1060
SONY G400 / F400	[illegible] 450

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Black 4 AFD Tune	$25
Black 40x ide CD-ROM	$75
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K6-II 3D 500mhz $600

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104 win95 KB and Mouse, Mouse Pad
56k voice fax modem v.90 int.

K6-II 3D 400/450	*$560/580*
K6-II 3D 500/550	*$600/680*

Optional

Windows'98 full ver with cd	+$150
15" 17" SVGA 1280x1024	+$180/260
Epson 660 / BJC2000	+$190/125
Colorcolor 600P scanner (After rebate)	$70
AOC 1600x1210 17" .25	+$200

BLUE TOWER / BLUE KB...$80/20

Celeron: iComer !!

AGP Celeron PPGA motherboard
64MB 144pin PC100 SDRAM
UltraIDE 15.0GB HD
8MB AGP video built-in
1.44 Fujitsu floppy
Slim ATX tower case power
PS2 104 KB and PS2 Mouse
50x cd-rom ide 3D Sound included
56k voice faxmodem v.90
10/100BT LAN 100Wspeaker

Intel Celeron 466/128k	**$600**
Intel Celeron 500/128k	**$610**
Intel Celeron 533/128k	**$680**
Intel PIII-550 /256k	**$790**
Intel PIII-600 /256k	**$830**

Optional

w/128MB SDRAM ...+$75 w/20.2G	+$90
RockLive 2000 4 spker + subwoofer	+$50
MS Windows 98 ver.2 w/ cd	+$190
MS Office 2000 pro.	+$450
Apollo P2200 (HP) printer	$75 (after rebate)

Windows2000 Pro w/system ...$195

P-III Package

Abit VT6X4 Asus P3V4X KX 133 AGP4x
128MB SDRAM PC133min
20G ATA66, 7200 Ultra IDE
ATI All-in Wonder 16M AGP
TV-in, TV-out and TV Tuner
50x CD-ROM, 1.44FD
Sound 97 on board
USR 56k voice fax modem
Landmark 200 ATX w/250W
104 Fujitsu 8725 keyboard
Microsoft Intelli mouse w/wheel and pad
Windows 98 full ver.2 with cd

Intel PIII 550/600	**$1450/1470**
Intel PIII-650/667	**$1490/1520**
Intel PIII-700/733	**$1590/1620**
Intel PIII-750/800	**$1700/1800**
Intel PIII-850/866	**$1980/2090**

Upgrade to

ATI All-in-Wonder AGP 32M	+$160
Asus V6800 Geforce Pro DDR 32M AGP	+$185
Sound Blaster Live! MP3 / Platinum	+$135/ +$260
ViewSonic EF70 / PF775 / PF790	$390/460/680
NEC FE700 / Fe750/ FP950/FP1350	$390/490/ 870/1390

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HP Servers/ Desktops (HP Advance Partnership)

On www.atic.ca

IBM Servers/Desktop/Laptop

Get one free color scanner from us if you Buy one IBM Server Desktop or Laptop from us by June 20 2000

(IBM 9.1 U2W scsi ...$270 IBM 18G U2W .$450)
(IBM 20G/7200 UIDE.. $250 IBM 40/61G 7200 $425/650)

i1400/2671460	C633/14.1TFT/64M/5G/DVD/FD/Li-Ion/56K/W98	$2730
i1400/2621482	C633/12.1TFT/64M/5G/24x/FD/Li-Ion/56k/W98	$2430
i1400/2621460	C500/14.1TFT/64M/12G/DVD/FD/Li-Ion/56K/W98	$3150
600E/2645590	P3-500/13.3"TFT/64M/12G/FD/24x/Li-Ion/56K/W98	$4890
600X/26459FU	P3-650/13.3"TFT/64M/12G/FD/DVD/Li-Ion/56K/WNT	$5400
Sever3000/8476700	P3 [illegible]/64M/40x/UW/FD/Lan10-100	$2295
Sever3500/865511Y	P3 [illegible]/64M/40x/UW/FD/Lan10-100	$2860
Sever4000/865351Y	P3-650/256M/9.1UW/FD/24x/Lan10-100	$6200
Sever5000	P3-700/128M/18U2W/40x/FD/Lan10-100	$4150
Sever5000R	P3-700/128M/18U2W/40x/FD/Lan10-100/Rack	$4700

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Intel Servers (Intel whole line products)

SC450NX Quad PIII Xeon550 CPUs 10-100TX 32x /Dual [illegible] and 1024 MB ECC RAM AGP Video 2 x 36G U2W hot swapable	$15 000
ISP2 50 Dual PIII-600 CPUs / 10-100TX / 32x /Dual U2W and 1024 MB RAM AGP Video 2 x 36G U2W hot swapable	$6990

NetMaster™

More on www.atic.ca

Intel i840 Supermicro P3DM3 Dual PPIII,
U2/U160scsi built on board
Intel 10/100BT LAN Server
AGP 32MB Video
512MB ECC-SDRAM
1.44FD 50x CD-ROM
Dual Redundant 2-in-1 300W x 2 ATX power
2x 18GB U2W SCSI HD
Fujitsu KB and Microsoft mouse

Intel PIII 650/700/750/800/850	**$3330/3450/3550/3660/3850**
Dual PIII 650/700/750/800/850	**$3750/3990/4190/4400/4780**

All listed prices (reflect 3% cash discount), quantities and specifications are subject to change without notice

MOTHERBOARDS

intel ASUS GIGABYTE

Abit BF6 (Slot-1) BE6-II 440BX ATX FD	$150/175
Abit VA6 / BP6 ATX AGP PII/ PIII	$120/195
Abit VT6X4 KA7 / KA7 100	$160/220/200
Intel OR840 w/ 2x 128M RIMM/600[illegible]	$1500
SuperMicro P6DBU 440BX Dual PII/PIII U2W and	$590
SuperMicro P6DBE 440BX Dual PII/PIII UIDE	$280
Supermicro P6SBU / S2DGU 440GX-Xeon	$600/650
Supermicro P3DME / P3DM3 i840 Dual U2W	$510/890
Asus P3B-F 440BX AGP PII/ PIII 233-600	$195
Asus P3V133/ P3V4X K7V	$130/189/240
Asus P5A ATX / P5A-B AT 100mhz AGP	$140/130
ATX Celeron M/B w/8M AGP audio modem	$115
Socket 7 ATX with AGP 4M, Audio ATX	$115
Asus K7M / M8I 8155 for AMD Athlon (k7)	$239/300
Gigabyte Motherboard for AMD Athlon (k7)	$190
Intel 440BX Quanta ATX AGP	$125
BOOK PC7000 case/52x/Video Audio/56	$280
SC450NX Tower, Quad-CPU sockets, Video, LAN	$5450
Intel ISP 150 1U Dual CPU socket Rack	$2290

HARD DRIVES

Quantum Seagate

Fujitsu 6.4/8/15/20G	$125/135/[illegible]/185
Quantum LM 15/20/30G	$210/250/350
WD ATA66 5.4/15/20G	$140/160/185
WD15/20/30/40G 7200	$180/230/295/420
Maxtor 8/15/25/30/40	$148/160/185/235/350
Maxtor 7200rpm 15/20/30/40G	$185/230/285/420
IBM 7200 20/30/40/61G	$240/310/425/650
Seagate 7200 20/30/40G	$230/280/420
Quantum Atlas-4 U2W 9.0/18/36G	200/480/1020
IBM U2W 9LP DDRS 9G/18G	$285/460
IBM U2W 2X 9G/18G/36K(10024rpm)	$500/880/1250
Seagate Sheeta 9/18.2/50G U2W	$350/560/1200
Seagate 18G/36G 10K rpm 10yrs	$560/1250
Removable HD kit EIDE/SCSI/U2W/scsi	$20/25/80
U2WSCSI 4Bay/8Bay case w/power	$150/250
Hot swapable IBM 18/ Seagate 36G 1"	$850/1250
Adaptec 2940U/ UW /U2W	$215/270/380
Adaptec KIT:2940 /2940UW/2940U2W	$220/280/330
Toshiba Notebook HD 6.0G/12G	$215/390

CPU

intel AMD

Intel P5 MMX 233	$90
Intel Celeron 466/500/533	$140/156/190
Intel Celeron-II 533/566	$210/240
Intel Pentium III 533 / 550 /600	$330/340/380
Intel P-III 650/667 /700/733	$400/420/510/626
Intel P-III 750 /800/850/866	$600/700/870/990
Intel Xeon P-III 550/512k, 550/1M	$1430 /3080
Intel Xeon P-III 600/667/700 2-way	$700/760/800
AMD K6-II 400 /450/475/500	$75/85/95/100
AMD K7 550/600/650/700	$250/260/270/300
AMD K7 750/800/850/900	$380/490/665/920
CPU fan Pentium / PII /Pro	$7/10/15
S370 adapter v1.0 / v1.1(dual)	$18/25
Dual PII fan / Dual K7 fan	$20

RAM

72pin 16/32/64M/128M EDO	$40/85/190/550
EDO-ECC 128/256M 168pin w/buffer	$450/780
Parity 72pin 32 / 64/128M	$90/170/490
SDRAM 32M / 64M PC100	$45/75
SDRAM 128M / 256M PC100	$150/300
SDRAM 64M/ 128M/ 256M PC133	$85/155/310
ECC SDRAM PC100 64/128/256	$90/170/330
ECC SDRAM PC133 64/128/256	$95/175/340
503 Video RAM 512k/1M	$6/$20
SO-DIMM 72p 8/16/32M	$60/80/150
SO-DIMM 144p 32/64/128M SDRAM	$70/100/180
SO-DIMM 144p 32/64/128 EDO	$90/160/350
Toshiba /IBM/ Dell notebook RAM	$ATIC CA

MODEMS

56k Voice Fax modem int. V.90 ISA/ PCI	$25
USR 56k v90 fax modem int PCI	$55
USR Sportster v.90 PCI (2976-01 Hardware)	$95
Supra 56k v.90 Voice PCI	$45
3COM USR 56k v.90 ext w/ voice	$200
PCMCIA 56K FaxModem	$80
Cisco 250-CH + IP Drivers	$2370
PCMCIA 56k v.90 with 100BT NIC	$215
PCMCIA 100BT combo / 10-100BT	$70/190
Xircom 56k RealPort modem	$250

VIDEO CARDS

matrox DIAMOND ATI

S3 Virge 3D 4M AGP	$19
ATI Xpert98 8M AGP	$60
ATI Xpert2000 32M AGP OEM/Retail	$115/120
ATI Fury 32M AGP 2x w/TV-out	$195
ATI Fury Pro 32M AGP4x w/TITO /retail	$195/210
ATI Fury MAXX 64M AGP w/TV-out	$340
ATI all-in-wonder 16M / 32M AGP	$180/300
Matrox G400 32m /Dual ports	$190/230
Matrox G400 32M MAX AGP4x	$340
Diamond S3-Savage4 32M AGP	$110
Diamond Viper-II 32M AGP4x	$160
3DFX Voodoo3 2000 16M AGP /PCI	$145/166
3DFX Voodoo3 3000 16M AGP	$190
3DFx Voodoo3-5500 16M AGP w/ Twin & Tvout	$290
Asus V6600 /6600Delux GeForce	$290/320
Asus V6800/6800Delux GeForce Pro DDR	$300/350
Asus V7700 Geforce-2 GTS 32M AGP4x	$485
Elsa Gladiac Geforce-2 GTS 32M AGP 4x	$490
Miro 3D +	$1120

MONITORS

SVGA 15" 17" .27 17" .25	$190/260/285
CTX 17" Flat .25 1600 Trinitron	$400
CTX 19" Flat .25 1600 Trinitron	$640
MAG XJ500T .25 15" / 786FD Flat .25 17"	$250/400
NEC AS70 17" /AS90 19"	$280/430
NEC FE700 .25 Flat / FE750 1600 Flat	$390/490
NEC FE950 /FP950 17" Flat	$750/870
NEC FE1250 /FP1350	$1120/1350
Panasonic SM70/SL95	$320/630
Panasonic s110 21" 1800x1600 .25	$1160
Sony E200/220GS [17"]	$490/500
Sony G400 Flat .25 19"	$860
Sony F400 Flat 17" / F500 Flat 21"	$1450/2680
Viewsonic Q71/ E771/ E773 .25	$300/300/370
Viewsonic Flat EF70/ PF775/ PF790	$390/430/680
ViewSonic E790 19" / PF815 21"	$510/1290
ViewSonic VP150 / VPA150	$1450/1650
Samsung 700NF 17" Flat	$310
Samsung 900NF 19" Flat	$650
Samsung 571TFT 1024 LCD Flat Panel	$1190
Samsung 800TFT 18" LCD Panel	$3050

NetBook ACCESSORIES

32M/64M/128MSDRAM	$[illegible]/160
NiMH battery	$150
Li-Ion battery	$290
Car auto adaptor	$100
AC Smart adaptor (110/220V)	$110
Toshiba 2.5" 6.0 / 12G HD	$215/390
Portable Printer BJC-80/50	$340/430
Carrying case	$40
PCMCIA 100BT/Coaxl combo	$60
PCMCIA100BT card	$130
PCMCIA56k Fax modem	$80
PCMCIA serial port/dual	$250/310
Flash RAM card player	$190
D-Link 56k/ 10-100	$220
3COM 10/100 PCMCIA	$310
3COM 56K PCMCIA fax modem	$320
3COM 56K w/ 10/100 LAN	$440
Xircom 100BT + 56K PCMCIA	$450
Intel 10/100BT + 56K PCMCIA	$410

CONTROLLERS

IDE ISA Super I/O	$30
Dual U2/DE ATA66 PCI controller	$85
Mylex UW scsi 950T (2940UW)	$170
Mylex U2W scsi 950T (3940U2W)	$290
Adaptec 2940/2940UW	$220/270
Adaptec 2940 U2W/ U2W kit	300/330
Adaptec 29160 U2W scsi/ Kit	$320/390
Adaptec AAA131 /AAA151 kit	$650/990
To 4Raid any PCI card	$60
Adaptec APA1460 slimSCSI kit	$200
Adaptec APA1480 slim (cardbus)	$290
Adaptec 3940 Dual uni-II	$550
Adaptec 3940UW Dual UW scsi	$589
Adaptec 3950U2W Dual U2W	$685
Adaptec 3945 Hot Connect	$820
Adaptec 1940 Fiber 1950	$1100/1190
Int PCMCIA to SCSI II adaptor	$150
Jaz Parallel to SCSI-II traveler	$75
scsi / Ultra U2W Mylex / U160 10pin cables	[illegible]

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Intel's 933mhz CPU in stock .../ AMD 950mhz...

Intel and AMD announced the 1Gh. CPU. Intel only shipped 850/866 and 933mhz by now. Our Landmark ATX fun case with i840 and Dual PIII-866 made the server on the top line. Intel Server with 4-Xeon CPUs has been sold over 20 units. Viewsonic full line Flat CRT has list on our Web. Please check the Vancouver hottest Web ATIC.CA

Abit VT6X4 [illegible] AGP 4x
Intel PIII-500 [illegible] IN 100/133 bus
128MB SDRAM PC133 w HD ATA66 ports
Landmark ATX299 tower w 250W
Creative 52x drive
Sound Blaster Live value
USR 56k voice fax modem
20G 7200 ATA66 HD
ATI FuryPro 32M w/ TITO AGP4x
RockLive subwoofer w 4 sur spkrs

MS Natural KB and MS Intellimouse
Microsoft Windows 2000-Pro with cd
Three years labor and one year parts warranty

Intel PIII-600/650/667/700/750
$1700 / 1720/ 1750/ 1840 /1950
Intel PIII-800/850/866/933
$2050 /2220 /2390 / 2700

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AMD K7 System

Abit KA7 AGP ATX ATA66 KX133
128MB PC133 SDRAM DIMM
1.44MB floppy drive
20G0 7200 ATA66 HD
ATI Xpert2000 32MB AGP
18" ATX tower case
50x CDROM
56k voice fax modem
Fujitsu 104 Keyboard
Lan 10/100BT NIC
Microsoft Intellimouse w/pad
PCI 128 Sound and 120W Speakers

- **AMD K7 550/600/650...$1240/1250/1260**
- **AMD K7 700/750/800...$1300/1390/1500**
- **AMD K7 850/900/950...$1600/1940/2150**

Optional

with 25 17" Flat CRT	+$370
with 25 17" 1600	+$280
with Panasonic 8x4x32x	+$290
Upgrade to ATI Fury 32M	+$50
Upgrade to Abit KA7 100	+$50

NetBook-6133sn 12"/13"TFT

1 [illegible] go
64MB RAM (Upgrade to 128M ...$150)
6.1G Toshiba HD (upgrade to 12G ...+$120)
56k Voice faxmodem Built-in
1.44 Floppy & 24x CD-ROM Built-in
12.1" 13.3" TFT Active True color
USB PCMCIA slot, PS/2 port, TouchPad
USB Infra, Parallel serial, Ext SVGA
3D sound, Microphone & speakers built-in
NiMH Battery
AC adaptor (110-220v auto-switch)
FREE carrying case
MS Win 98 full ver.2 w/ CD and license
All drivers preload and with cd

- 12.1"TFT Celeron 500 / Celeron 566......$2190/2290
- 12.1"TFT P3-600/650/700/750...$2390/2450/2550/2600
- 13.3"TFT Celeron 500 / Celeron 566......$2150/2450
- 13.3"TFT P3-600/650/700/750...$2550/2600/2700/2800

with Car adaptor	+$110
with 10BT combo card	+$70
with 10/100 BT card	+$100
with 56k & 10/100 Lan	+$190
with 96MB	+$80

NetBook-6020-14.1"TFT

Intel [illegible] Mobile CPU
64MB RAM (128MB ...$150)
6.1G Toshiba HD (12.0G ...+$120)
AGP 4M Video built in
RealPort 56k voice fax modem
1.44 Floppy 24x CD-ROM (DVD +$200)
14.1" TFT Active True color 1024x768
3D sound, Microphone & spkr built-in
Dark Silver USB Infra, Parallel serial,
2 PCMCIA slots, S-Video out-put
Li Ion Battery w Led
AC adaptor (110-220 auto switch)
FREE carrying case
Win 2000 full ver With cd
All drivers preload and with cd

- 14.1" TFT PIII-450/500......$2300/2450
- 14.1" TFT PIII-600/650......$2950/3100

NetBook-6120 14.1" TFT

14.1" TFT Active color 1024x768
AGP 8M 3D Video card built in
Silver body color. All-in-one 6.2 lb only
Intel Mobile Celeron 333/366/400 466/500mhz
64MB RAM (96M +$80 128M +$150)
6.1GB Toshiba notebook HD (to 12G +$120)
RealPort 56k voice fax modem
1.44 Floppy 24x CD-ROM (DVD +$250)
3D sound, Microphone & speakers built-in
USB Infra, Parallel, serial, Ext. SVGA port
2 PCMCIA slots
Li-Ion Battery with indicator
AC adapter (110-220 auto switch),
Win 98 full ver.2 with cd
FREE carrying case

- 14.1"TFT Celeron 500.........$2490
- 14.1"TFT Celeron 566.........$2590

NetBook-Top Silver 14.1" TFT

14" TFT [illegible]
AGP 4M 3D Video card built-in
Silver body color, All-in-one 6.2 lb only!
64MB RAM 96M +$80 / 128M +$150
6.1G Toshiba HD (to 12G $120)
56k fax modem
1.44 Floppy 24x CD-ROM (DVD $200)
3D sound, Microphone & spkrs built-in
USB Infra, Parallel, serial SVGA port
PS2, S-Video, Doc Station ports
2 PCMCIA slots Li-Ion Battery
AC adaptor (110-220 auto switch),
Win 98 full ver 2 with cd,
FREE carrying case

- 6130N 14.1" TFT Celeron 500.........$2600
- 6120N 14.1" TFT PIII-600/650......$2750/2800
- 6120N 14.1" TFT PIII 700/750......$2900/3000

(Upgrade to Win2000pro	+$80
(Upgrade to Win NT 4.0 WKST.	+$100)

As one of the major providers of the notebooks in Vancouver we had sold over 2000 units of Netbook in western Canada. As the factory **authorized service center** we provide upgrade service for Toshiba, IBM, Compaq, Fujitsu, Acer, Arca, Sharp Canon, a Winbook, Netbook, NEC Book, Sceptre and other clones ....

Toshiba

4070CDT- Cel366/64M/4G/13.3"TFT/24x/W98/56k	$2950
4360XDVD-P3-600/64M/12G/14.1"TFT/DVD/W98	$4120
4270XDVD-Cel500/64M/6G/14.1"TFT/DVD/56k/W98	$3150
4270ZDVD-Cel500/64M/12G/15.1"TFT/DVD/56k/W98	$3[illegible]
4560XDVD-P3-600/64M/6G/14.1"TFT/DVD/56K/W98	$4390

IBM ThinkPad

Get one **FREE** color printer if you buy one IBM notebook, IBM server or IBM desktop from us by June 10, 2000.

1400/2621402-Cel500/64M/12G/14"TFT/56k/W98/DVD	$3150
600X/2645SEU-P3-500/64M/12G/13"TFT 56k/W98/24x	$4890
600X/2645SFU-P3-450/64M/12G/13"TFT/56k/W98/DVD	$5400

Compaq *(Presario and Armada carried)*

1200XL/102 -K6-450/128M/5G/12"HPA/56k/W98/24x	$1090
1200XL/107 -K6-475/64M/6G/13"HPA/56k/W98/24x	$2190

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PRINTERS

HP Apollo P2200 720dpi ....$75 (after rebate)

HP DJ 340C/ 840C	$240/251
HP 610/ 970C / 1120C	$210/550/690
HP 2000C / 2000CN	$860/1450
HP 1100 ljpro2M / 2100 lj/PT2M	$570/1650
HP 4050 /4050N/4050TN	$1550/2200/2400
HP 5000/5000N/GN	$2[illegible]/3[illegible]/3600
HP 8100/8100N/8100DN	$3520/4430/4390
HP Colorlaser 4500/4500N/4500DN	$3660/4231/5559
HP Colorlaser 8500/8500N/8500DN	$8690/9700/12[illegible]
HP OJ 725C color printer/copy/scan/fax	$565
HP laser 3100X printer/copy/scan/fax 8p	$990
HP Color Plotter, HP accessories ...	www.ATIC.CA

Canon

BJC1000/2000C/2100/6000	$100/130/150/350

Lexmark

Lexmark Z11 Z31 Z51	$100/170/300
Optra E310(special)	$480

Epson

Stylus 440/660/760	$130/150/250
Stylus 850 (1440dpi) 1520c	$400/650
Stylus 900 900N	$800/[illegible]

Brother

HL 1030 10ppm	$320
HL 1240DX / 1250 DX	$455/ $560
Toner Tn100 / Tn200	$35

Okidata

OL8W 600dpi laser	$229
OL8W 600dpi laser	$370

CASE / KB /MOUSE / Cables

ATIS 19" 23" case & power	$40 35 70
ATX 15 /18"/23" case & power	$45 50/70
InWin ATX case 17" / 20" & power	$25/100
Server 2-in-1 Redundant Xeon	$330/650
Landmark ATX 299 plastic extra fan	$110
Landmark ATX-202/200 18" with 250W extra fan	$80
NetMouse w/wheel / Logitech 2k w/wheel	$10/10
MS IntelliMouse / Intelli Explorer / USB	$25/05/80
Logitech Marble mouse / USB	$85/[illegible]
Logitech Internet KB / cordless mouse & KB	$40/145
104KB Fujitsu4725 / Fujitsu 4725	$12/20/60
MS Natural / TouchPad KB	$35/[illegible]
MS natural USB / USB keyboard	$75 / 30
Black KB Blue KB	$20/20
Black mouse / MS black mouse	$20/25
Scsi cable/ Wide scsi cable	$10/15
scsi 4 devices cable (scsi/UW scsi)	$35
Flat Scsi cable / 25p-HD50p/25p-HD68p	$25/40/40
ext. Scsi cable (any pin to Centronics)	$40
Rack mounting IDE/SCSI drawer	$20/25
Rack mounting U2W scsi	$75
Printer cables 5ft/10ft/25ft	$5/10/18
Modem cables/Laplink cables	$10/15
Ethernet cables	in stock

MULTIMEDIA

DVD KITS

Toshiba DVDrom / Panasonic DVDrom	$220/185
Creative DVD4 Encore x8 ins.(retail)	$340
Black DVD drive	$250
Hollywood+ decodable card	$100

SOUND CARD

[illegible] / SB PCI 64 / SB PCI128	$18/35/45
Soundblaster PCI Live! X-Gamer / Live! MP3	$135
SB PCI Live/Value / Live! Platinum	$70/255
Soundblaster [illegible]	$[illegible]

CD-ROM 52x int Eide $65

Creative 52x Toshiba 40x Eide	$70/60
ACer 50x Black 40x CD-ROM	$60/70
40x scsi Pioneer Toshiba 40x scsi	$110 /120
Backpack 16x parallel cdrom with sound	$260

CD WRITER Panasonic 8x4x32 $200

Creative 8432 Rewrite w/pen (retail)	$320
HP 9310i 10x/4x/32x retail kit	$300
HP 8250i 4x4x24x retail	$265
Sony CRX145 kit 32x10x4x	$370
Yamaha ... 8x4x32x / kit	$330/380
Yamaha 6416SX ext	$400
Plextor 8432 retail kit int. slide	$370
writeable cd-disk /Sony	$1.5/1.8
Rewritable cd-disk/Sony	$4/6

SPEAKER ACS 33 w/Subwoofer $70.

120W Subwoofer 400W	$10 / $35
Fortma 8816 5107	$45/100
RockLive 2000 Subwoofer w/4 spkr	$50
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ATX Black 19" 250W Extra fan	$90

Photo album software, take three

Continued from page 38

with sound and standalone player as an executable.
Cons: Does not handle other media files like video, animations. Setting image keywords may be tedious.
Out of the box: A small 16-page manual gets you started on a system that's fairly intuitive to use.
Overall rating: 4.2 out of 5

At first glance PhotoRecall is quite different from Jasc's Media Center. PhotoRecall has a second, standalone window for the catalogue or photo album and it does not support the multimedia file types like animations and video, instead sticking to image and sound files (and sound files are strongly linked to images). But a second look shows some similarities between the two programs.

PhotoRecall processes images at a rate of 420 per minute (our tests involved a 12 GB drive, the processing of more than 2,000 images in the album) and offers the same methods of populating an album as the Jasc product namely, directory scanning, file at-a-time or scanner/digital camera input. And images in the photo album can have comments and keywords added (but there is no way to set keywords for a group of images as in Media Center), then searched or sorted based on the keywords. PhotoRecall also has slideshow and Web output options comparable to Media Center.

However PhotoRecall adds some distinctive features here. First, PhotoRecall allows users to set an image as wallpaper. Also, as noted sound clips can be linked to specific images and a slideshow created. Slideshow creators who have used 35mm colour slides will be familiar with these features. More significantly, the slideshow created by PhotoRecall can be saved as a standalone executable file, which you can send to others by email or give away on floppy diskette. The user just double-clicks on the show.exe icon and a complete slideshow is available, without having to install the PhotoRecall software on the user's PC.

PhotoRecall has other thoughtful features, such as the ability to produce reports on the contents of an album, publish to the Web with a variety of settings, and make simple edits with G&A's Darkroom by simply double-clicking on an image. It is also easy to drag and drop an image from PhotoRecall into any popular image-editing program, like PhotoPaint, Photoshop, or Painter. Finally, PhotoRecall makes it easy for users to send images by email—either as slideshows or as individual pictures—with attached comments. In sum, if you are a 35mm photographer looking for a program that—in addition to cataloguing your growing collection of images—allows you to quickly distribute images in a variety of nifty ways, look no further. Photo Recall is more than equal to the task—and at a good price.

Photo Explorer Gizmo

From: Play Inc.
Tel: 800-306-PLAY http://www.play.com
Street price: $60 (for full Gizmos MegaPak)
Pros: Snazzy and simple—catalogues 14 popular image file types, which can be dragged and dropped into other apps or printed out.
Cons: Minimal feature set.
Out of the box: Very simple operations.
Overall rating: 3.5 out of 5

Play's Photo Explorer, part of the Gizmos MegaPak, takes a minimalist approach to image catalogues/albums. It supports 14 popular image filetypes including BMP, GIF, JPEG and TIFF. Photo Explorer works like Windows Explorer, cataloguing all the images on a direc

Continued on page 51

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•Ports, headers and others

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- •SPDIF In/Out header for digital audio interface
- •IrDA Cable header COM Port header Two CD-In headers
- •Green HDD, power indicator LED headers
- •LAN Card Wake Up/Internal Modem Ring Wake-Up headers
- **•Fax/Modem DAA Module**

56Kbps Fax/modem DAA Module Supports V.90 V.34 V.32bis, V.32 V.22bis, V.22 Supports Auto Fallback and MNP 5 V.42bis data compression with 115200 compatible Virtual UART Requires 16 MB RAM and WIN 95/98/NT

- •LAN Chip PCNet DM9102
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The advanced features of Ali Aladdin TnT2 mainboard include.

- •Socket 370 processors support the newest FC PGA Pentium III processors as well as the Celeron PPGA
- •All Celeron are automatically configured using firmware
- **•Two DIMM slots for 3V SDRAM 168-pin memory modules**

Support for 66 MHz 100 MHz and 133MHZ memory bus Maximum Installed memory can be 2 x 256 MB 512 MB

- •Three 32-bit PCI slots
- •Onboard IDE channels - Support for Bus mastering and UltraDMA 33/66 modes
- •Power Supply and Power Management
- **•Provides AT/ATX power connector**

Support for Green PC standard Suspend Switch and Keyboard Power On/Off (needs Win98 keyboard) Support Wake on Modem Wake on LAN and Wake on Alarm

•Built-in Graphics System

3D Hyper Pipelined Architecture Parallel Data Processing (PDP) and Precise Pixel Interpolation (PPI) Full 2 D H/W and Motion Video Acceleration Up to 1600x1200 in 8-bit color at 85 Hz refresh H/W Motion Compression Assistance for S/W MPEG2 decode

•Sound System - Meets PC98 audio specification

Full duplex playback and recording with built in 16-bit CODEC Downloadable Wave-table Synthesizer supports Direct Music

•Onboard I/O Ports - Floppy disk driver port with 1Mb/s transfer rate

One serial port with 16550-compatible fast UART One parallel port with support for ECP and EPP Two USB ports, one PS/2 port (for mouse) and one infrared port(optional)

•Hardware Monitoring

Built-in hardware monitoring for CPU temperature and fan speeds Supports AMI's Desk Client Manager (ADCM)

•Onboard 10/100M LAN Adapter

LAN controller integrates Fast Ethernet MAC and PHY compliant with IEEE802.3u 100BASE TX 10BASE T and ANSI X3212 TP-PMD standards Compliant with ACPI 1.0 and the Network Device Client Power Management 1.0 High Performance provided by 100Mbps clock generator and data recovery circuit for 100 Mbps receiver

•Fax/Modem DAA Module Option

56Kbps Fax/modem DAA Module Supports V.90 V.34 V.32bis, V.32, V.22bis V.22 Supports Auto Fallback and MNP 5 V.42bis data compression with 115200 compatible Virtual UART Requires 16 MB RAM and WIN 95/98/NT

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The key features of the Intel 810 mainboard include.

•Socket-370 Processor Support

The PPGA Celeron provides Pentium II performance with integrated level 1 and level 2 cache memory PPGA Celerons run from 300 MHz through to 533 MHz Supports a 66 MHz front side systems bus All Celeron are automatically configured using firmware,

•Two DIMM slots for 3VSDRAM 168-pin memory modules

Support for 66 MHz and 100 MHz memory bus Maximum Installed memory can be 2 x 256 MB 512 MB

- •Three 32-bit PCI slots
- •Onboard IDE channels Support for Bus mastering and UltraDMA 33 modes
- •Power Supply and Power Management
- •Provides AT/ATX power connector Support for Green PC standard, Suspend Switch and Keyboard Power On/Off (needs Win98 keyboard)- Support Wake on Modem, Wake on LAN and Wake on Alarm

•Built-in Graphics System

3D Hyper Pipelined Architecture Parallel Data Processing (PDP) and Precise Pixel Interpolation (PPI) Full 2 D H/W and Motion Video Acceleration Up to 1600x1200 in 8-bit color at 85 Hz refresh H/W Motion Compression Assistance for S/W MPEG2 decodes

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Two paths to multi-megapixel quality

Kodak and Olympus are among several manufacturers offering 2 megapixel digital cameras. Each company, however, has its own ideas about what constitutes a premium design.

By David Tanaka

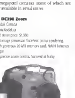
If you scan the spec sheets of the Kodak DC 290 and Olympus Camedia C 2020, you might conclude that these cameras are pretty much the same. Both have 3x optical zoom lenses, both capture 2.1 megapixel images, and both offer the option of saving high resolution images as uncompressed TIF files. From that common ground, however, they rapidly diverge. Make no mistake: both take high quality pictures that will satisfy most photographers, they just go about it in two distinct ways.

If you are looking to accessorize your computing with a digital camera, these devices are worth considering. However, this tale of two cameras could just as easily have been the tale of 10 cameras. Unlike film cameras, where a given dollar amount will give you comparable features from a variety of manufacturers, digital cameras that cost about the same can vary widely in physical design and features.

Another factor to keep in mind is that digital camera evolution is occurring quickly and that means models change frequently. Earlier this year, many camera makers announced 3 and 4 megapixel cameras, some of which are already available in retail stores.

Kodak DC290 Zoom

From: Kodak Canada
http://www.Kodak.ca
Estimated street price: $1,500
Pros: Fast image processor. Excellent colour rendering. Ships with generous 20 MB memory card, NiMH batteries and charger.
Cons: Imprecise zoom control. Somewhat bulky.



My initial impressions of the Kodak DC265, the precursor to the 290, were not favourable. It was too big to be a pocket camera, but didn't have the features (such as extensive manual exposure controls) that serious amateurs have come to expect in a premium camera. But first impressions can be deceiving. After working with the 265, I grew to appreciate the ergonomics as well as the technology within.

Outwardly, the DC290 is similar to the DC265, but it has a few features that make it a worthy successor. It will take higher resolution pictures and can save images in an uncompressed TIFF format.

This camera has a lot of good features, but one of the most impressive is the speedy image processor. To save even an uncompressed 6 MB file took just a few seconds. The camera's control and setup menus are comprehensive and easy to navigate, although the colour LCD screen, which doubles as the auxiliary viewfinder, is virtually impossible to read outdoors in bright light. However, controls for commonly-used functions such as image quality (resolution) and flash options are located on a separate monochrome readout, which is easy to read even in bright light.

The worst feature of this model is the zoom control. The zoom motor is very fast but the control lever is imprecise. That combination makes accurate framing of a specific zoom point difficult. I found I was constantly missing the stop point that would frame the scene the way I wanted.

I would recommend this camera to anyone who likes to take lots of pictures and appreciates advanced camera features, but doesn't treat photography as a serious hobby in itself. The camera does not have the user-controllable options serious photographers might want, such as the choice between aperture priority or shutter priority modes. However, some manual adjustments to exposure control are possible, and the camera generally does an admirable job of handling a number of exposure conditions.

Olympus Camedia C-2020 Z

From: Olympus (distributed in Canada by Carsen)
http://www.olympus.com
Estimated street price: $1,300

Pros: Traditional 35 mm camera "feel." Many user-controllable exposure options. Variable sensitivity equal to ISO 100 to ISO 400. Ships with NiMH batteries and charger.
Cons: Standard memory card (8 MB) offers limited storage for high-resolution images.

Anyone who appreciates the feel of a good 35 mm rangefinder camera will like the Camedia C-2020. Olympus's many years of camera design shine through in this model, and it could easily be mistaken for a film camera. The main power/mode switch mimics the shutter speed dial on film cameras, and it even has lugs for attaching a genuine neck strap (which is included) rather than one of those puny wrist straps found on most digital cameras.

The C-2020 also works more like a traditional camera, offering a wide range of exposure controls. The camera's sensitivity can be set to replicate three film speeds: ISO 100, 200 and 400. You also have a choice of metering modes, as well as the option of selecting automatic, shutter priority or aperture priority exposure control. The 3x optical zoom lens is equal to a 35-105 zoom in 35 mm terms.

Saving a picture on the Olympus in uncompressed TIFF format results in a 5.5 MB file. While the image quality is very good, the camera took a long time to process and save the image.

The Olympus has a few limitations. First, the capacity of the memory card that ships with the unit is 8 MB, so you can take just one uncompressed image (and a few compressed ones) before you have to unload the card. This is an easy problem to solve—just ship a bigger memory card like the 20 MB card Kodak includes with its camera.

More difficult to solve is the pokiness of the image processor. After taking a picture using the uncompressed image setting, the camera's busy light flashed for 30 seconds before it was ready to take another picture. The highest quality compressed setting (least amount of compression) still produces images of good quality, with just minor delays between shots, so this will be a non-issue for those not interested in saving images in uncompressed format.

This model will serve the point-and-shoot crowd very well, but it also gives the more serious photographer the ability to control many exposure settings.

Compressed vs. uncompressed images

Both these cameras allow you to save images as uncompressed TIFFs. We see the ability to store in uncompressed format as a desirable feature, although not everyone will care about it. So, what's the big deal about uncompressed images?

Image files can be huge. Each uncompressed image from the Kodak DC 290 takes up 6 MB; Olympus's uncompressed image files take up 5.5 MB each.

Because storage cards are very expensive (currently about $100 for a 16 MB card), image compression is one of technologies camera makers use so they can sell a camera at a reasonable cost that will hold more than just a couple of digital images. Most digital camera makers have used JPEG compression to reduce the files to a manageable size. The reduction in file sizes is significant. For example, the file size for the Kodak DC 290 goes from 6 MB uncompressed to 500KB or less depending on how much compression you specify.

JPEG is known as a lossy method of data compression, which means that during compression, image information is discarded. It's a fact that JPEG images always have less picture information than uncompressed images, but the visual impact of that depends on the type of image, and the amount of compression that's being applied. Camera makers will typically offer users a choice between saving images at low, medium or high compression (the higher the compression, the smaller the file, but the more information discarded).

We've taken compressed and uncompressed pictures of the same scene with the same camera, and inspected the images at high magnification (1,000x). When you blow up a picture that much, you can compare a common feature from both images, pixel by pixel. In every case, we could see differences between a compressed and an uncompressed image, but those differences did not automatically mean that the compressed image always looked inferior. When printed snapshot size on a photo quality inkjet (we used the Lexmark JetPrinter 5770 for our tests), the differences were not noticeable in many cases. Even when printed at larger sizes, the images were quite impressive. However, some compression artefacts along edge details are noticeable.

340 megs and nowhere to go

While we were testing the cameras, we obtained two devices in the new CompactFlash II (CF II) format: a SanDisk 160 MB card, and an IBM 340 MB microdrive. (CF II cards are the same length and width as the original CompactFlash format, but are only half as thick.)

We were not, unfortunately, able to test them in the cameras reviewed above, because neither camera has a CF II slot. The Kodak uses a Type I CF slot, while the Camedia uses a SmartMedia card. Sixteen megabyte cards in both CF and SmartMedia formats currently cost between $100 and $120, while 64 MB cards cost are $350 to $400. The 160 MB CF II memory card has a suggested retail price of approximately US$500, according to a SanDisk representative, while IBM's 340 MB microdrive sells for US$450. IBM expects to bump the capacity of the microdrive to 1 GB by the end of this year.

Doing some rough math, a 160 MB CF II card could hold 25 or more uncompressed images from either camera, had they a slot to accommodate it, and anywhere from a few hundred to several hundred compressed images. The microdrive would store more than 50 uncompressed images.

We have been using both CF II storage devices with a Canon PowerShot Pro70, one of the few digital cameras with a CF II slot (in fact the Canon has one CF II slot and one standard CF slot). With the Canon's high capacity battery, it is a pleasure to be able to shoot 50 or 60 pictures during an afternoon without having to worry about finding a computer to download images from a full memory card, or running out of battery power. (The 160 MB storage card will hold more than 400 high resolution images. We're not sure exactly how many pictures you could store on a microdrive because the Canon's counter stops at 999 pictures.)

The PowerShot Pro70 was a premium prosumer camera when it was introduced about 18 months ago, but we've seen it discounted in Toronto-area stores to as low as $799—a good sign that a new model is on the way. It's a 1.7 megapixel unit, and limited in user-controllable exposure modes compared to more recent prosumer cameras. However it has good optics and does save images in uncompressed format. ❑

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IntelPentium III DreamMachinefor PowerUser

Pentium III Power User

ASUS P3V / Gigabyte 6VXE7 M/B
133MHz FSB & UDMA66 Ready
64MB PC100MHz SDRAM
10.2GB Ultra66 HDD
Panasonic 1.44MB FDD
ATI Rage 3D 8M AGP Video
15" N-I L R SVGA Monitor
Acer 107 Win 98 Keyboard
ATX Tower w/ 250W P/S
Acer Wheel Mouse & Pad
48x UDMA CD-ROM
Acer 3D Wave Stereo Sound
120W Stereo Speakers

64MB 10.2GB 15" SVGA Monitor ATI 8M Video 48X CD-ROM

Model	Price	Lease
P-III-550	1138	$39.80/mo
P-III-667	1178	$41.60/mo
P-III-700	1268	$44.80/mo
P-III-733	1298	$45.90/mo*

Pentium III Dream Machine

ASUS P3V / Gigabyte 6VXE7+ M/B
133 MHz FSB & UDMA66 Ready
64MB PC100MHz SDRAM
10GB Ultra66 HDD
Panasonic 1.44MB 3.5" FDD
Riva TNT2 32M 4x AGP Video
Samsung 750S 17".24 Monitor
Acer 107 Win 98 Keyboard
ATX Tower w/ 250W P/S
Acer Wheel Mouse
Creative 52X CDROM Drive
SoundBlaster PCI 128
280W Stereo Speakers

64MB 10GB Riva TNT2 32M AGP 17".24 Monitor 52X CDROM SB PCI128

Model	Price	Lease
P-III 650	1328	$46.50/mo
P-III-667	1368	$47.80/mo
P-III-700	1468	$51.80/mo
P-III-733	1498	$52.50/mo

Pentium III DVD Theatre

Asus P3V4X / Gigabyte 6VX-4X M/B
133 MHz FSB & UDMA 66 Ready
128MB PC100MHz SDRAM
20GB UDMA66 HDD
Panasonic 1.44MB FDD
NEC A570 17".27 Monitor
Riva TNT2 32M 4X AGP
Multimedia Keyboard
ATX Tower w/ 250W P/S
Microsoft Wheel Mouse
Asus 8X DVD Drive
SoundBlaster Live 1024
AltecLansing Spkrs+Subwfr

NEC 17" Monitor 128 MB 20 GB Riva TNT2 32M AGP DVD 8x SB Live

Model	Price	Lease
P-III-650	1678	$58.90/mo
P-III-667	1718	$60.00/mo
P-III-700	1798	$63.00/mo
P-III-733	1828	$63.80/mo
P-III-800	2038	$71.80/mo
P-III-866	2368	$82.80/mo

Pentium III CD-Creator

ASUS P3V / Gigabyte M/B
133MHz FSB & UDMA 66 Ready
128MB PC133 SDRAM
20GB Ultra66 HDD
Panasonic 1.44MB FDD
Riva TNT2 32M 4X AGP
Viewsonic E771 17" Monitor
Multimedia Keyboard
ATX Tower w/250W P/S
Microsoft Wheel Mouse
Sony 8x4x32 CD-RW
SoundBlaster Live 1024
AltecLansing Spkrs+Subwfr

E771 17" Monitor 128 MB 20 GB 8x4x32 CD-RW SB Live Riva TNT2 32M AGP

Model	Price	Lease
P-III 650	1788	$62.80/mo
P-III-667	1828	$63.80/mo
P-III 700	1908	$66.80/mo
P-III-733	1938	$67.80/mo
P-III-800	2138	$75.00/mo
P-III-866	2468	$86.60/mo

All P-III systems come with 5-year service & 2-year parts warranty and one month FREE internet

Options: Windows 98SE ***+$138*** • Acer 56K V.90 V/F/Modem (HW) ***+$50*** • Acer 10BT Ethernet Card ***+$18*** • MS Windows 2000 Pro ***+$208*** • MS Office 2000 SBE ***+$288*** • MS Office 2000 Pro ***+$460***

Power/ BudgetMaximizer

Celeron Net-Surfer

ECS Dual-Slot Mainboard
64MB PC100MHz SDRAM
10GB Ultra66 HDD
Panasonic 1.44MB FDD
3D 8M AGP Video
Acer 107 Win 98 Keyboard
17" ATX Tower
MS Trekker Mouse + Pad
48x CD-ROM
3D Wave Stereo Sound
120W Stereo Speakers
56K Modem & 10/100 BaseT LAN
15" SVGA Monitor +$170

64MB 10GB Modem & LAN

Model	Price	Lease
C-500MHz	660	$23.00/mo*
C-533MHz	680	$23.80/mo*
C-566MHz	750	$25.50/mo*

Celeron WorkHorse

Gigabyte AGP Mainboard
133MHz FSB & UDMA66 Ready
64MB PC100MHz SDRAM
10.2GB Ultra66 HDD
Panasonic 1.44MB FDD
ATI Rage 3D 8M AGP Video
Samsung 750S 17" Monitor
Acer 107 Win 98 Keyboard
17" ATX Case w/ 250W P/S
Acer Wheel Mouse + Pad
48x U-DMA CD-ROM
Acer 3D Wave Stereo Sound
120W Stereo Speakers

64MB 10.2GB Samsung 17".27 Monitor ATI 8M Video

Model	Price	Lease
C-500MHz	978	$34.50/mo*
C-533MHz	998	$35.00/mo
C-566MHz	1068	$37.50/mo

AMD Athlon(K7) PowerMax

Athlon Dream Machine

AMD Athlon (K7) CPU
Gigabyte Athlon M/B
64MB PC100MHz SDRAM
10GB Ultra66 HDD
Panasonic 1.44MB 3.5" FDD
Riva TNT2 32M AGP
Samsung 750S 17".24 Monitor
Multimedia Keyboard
ATX Tower w/ 300W P/S
MS Wheel Mouse
Creative 52X CD-ROM
SoundBlaster PCI 128
280W Stereo Speakers

64MB 10GB Riva TNT2 32M Samsung 17".24 Monitor 52X CD SB PCI128

Model	Price	Lease
K7-650	1278	$44.80/mo
K7-650	1318	$46.00/mo
K7-750	1368	$48.00/mo
K7-800	1418	$49.80/mo
K7-850	1538	$53.80/mo

Athlon DVD Theatre

AMD Athlon (K7) CPU
Gigabyte Athlon M/B
128MB PC133MHz SDRAM
20GB Ultra66 HDD
Panasonic 1.44MB 3.5" FDD
Riva TNT2 32M AGP
Samsung 750S 17".24 Monitor
Multimedia Keyboard
ATX Tower w/ 300W P/S
MS Wheel Mouse
Asus 8X DVD
SoundBlaster Live 1024
ML 460 Speakers + Subwoofer

128MB 20GB Riva TNT2 32M Samsung 17".24 Monitor 8X DVD SB Live

Model	Price	Lease
K7-700	1638	$57.50/mo
K7-750	1696	$60.50/mo
K7-800	1818	$63.80/mo
K7-850	1948	$68.00/mo
K7-900	2228	$78.00/mo*

All Celeron & AMD systems come with 3-year service & 1-year parts warranty and one month FREE internet

Options: Windows 98SE ***+$138*** • Acer 56K V.90 V/F/Modem ***+$50*** • Acer 10BT Ethernet Card ***+$18*** • MS Windows 2000 Pro ***+$208*** • MS Office 2000 SBE ***+$288***

CPU/RAM

16M 72pin EDO 2x8/ 4x4	$40/70
32M 72pin EDO 2x8/ 4x4	$108/120
32M PC100 SDRAM OEM/ Major	$50/55
64M PC100 SDRAM OEM/ Major	**$68/88**
128M PC100 SDRAM OEM/ Major	**$168/188**
256/ 512M PC100 SDRAM	$360/788
64M PC133 SDRAM OEM/ Major	**$98/105**
128M PC133 SDRAM OEM/ Major	**$168/198**
256/ 512M PC133 SDRAM	$370/860
128/ 256M PC100 ECC SDRAM	$215/408
128/ 256M PC133 ECC SDRAM	$220/418
AMD CPU	
K7 550/ 600/ 650	**$208/266/268**
K7 700/ 750/ 800	**$318/360/468**
K7 850/ 900/ 950	**$598/868/1038**
Intel CPU	
Celeron 500/533/566	$148/160/188
P III 600/650/667	$348/368/378
P-III 700/733/750/800	$468/478/590/690
P-III 850/866	$998/1008

Motherboards

Athlon (K7) Motherboard	
ASUS K7M	**$218**
Gigabyte GA-7 IXe	**$188**
Microstar MS-6195	**$188**
Celeron / P-III Motherboard	
ABIT VA6/ VT6	$128/160
Asus P3V/ P3V4X	**$128/188**
Asus P2-99/ P3B-F	$145/185
Asus P2BD/P2BS/P2BDS	$308/448/648
Gigabyte 6VXE+/ 6VX-4X	**$118/146**
Intel CA810EA/ CA810EAL	**$158/248**
Intel N440BX/ L440GX (server)	$708/750

Drives & Controllers

Fujitsu (UDMA66 IDE/ U2W SCSI)	
10.8/ 13/ 17/ 20G	**$136/160/168/188**
10/13/20/27G (7200rpm)	$178/198/260/338
9.1/ 18.2G U2W SCSI	**$318/498**
IBM (7200rpm IDE/ U2W SCSI)	
20/27G U-DMA 7200rpm	**$250/318**
9G/ 18G U2W SCSI	$338/568
Maxtor (Ultra 66 IDE)	
10.2/ 15/ 20G	**$138/160/186**
27/ 40/ 60G	$260/336/448
15/ 20/ 27G 7200rpm	$188/238/278
30/ 40G 7200rpm	$298/388
Quantum (UDMA66 IDE/ U2W SCSI)	
LM 15/ 20/ 30G 7200rpm	**$198/238/318**
Atlas IV 9.1/ 18.2G U2W SCSI	$328/548
Seagate (U2W SCSI)	
Barr 9 / 18G U2W SCSI	$468/768
Cheetah 9 / 18G U2W SCSI	$468/768
Western Digital (U-DMA IDE)	
10 / 13 / 20 / 30G	$148/168/188/288
15 / 20 / 27G 7200rpm	$168/248/318
Adaptec (SCSI Adapter)	
2930U / 2930U2	**$138/328**
2940 U2W / U2W Kit	$328/388
TekRam 310/ 390F SCSI Adapter	$86/146

Tape Backup

Tecmar Ditto Max Pro 10G Int.	$318
Onstream 30G IDE/SCSI Int.	$408/688
Onstream 50G SCSI Int.	$968
Onstream 30G Disc (3-pack)	$138
Seagate 8GB TR-4 Int. IDE/SCSI	$298/368
Seagate 8GB DAT SCSI Int	$738

Scanners

Acer 620P / S20U / 620PT	$138/148/248
AGFA Snapscan 1212P/ 1212U	$138/148
Canon 330P (-$30 rebate)	**$108**
Canon 330P(-$30)	**$146**
Canon 630U(-$30)	**$186**
Epson 610 / 636U / 1200U	$218/278/346
HP 4200C / 5300 USB	**$258/388**
HP 6300C / 6350C USB	**$515/626**
Primax 600P ($45)	$78
Visioneer OneTouch 7600 USB	**$100**
Visioneer Colorado 19200 USB	**$166**

CD / DVD / Sound

Acer 40x / 48x / 52x CD-ROM	$50/55/66
Creative 52x / Toshiba 48x	$68/88
Asus 8x DVD / LG 8x DVD	$178/178
Pioneer 16x IDE / 6xSCSI DVD	$208/198
Sigma DVD Controller PCI	$119
Acer 3D Wave PnP Sound	$22
Diamond MX300	$110
SoundBlaster Ensonic/ 128 PCI	$38/50
SoundBlaster PCI 512/ Live 1024	$70/78
SoundBlaster Live Platinum	**$268**
SoundBlaster Live Xgames	**$138**

ZIP / JAZ / LS120

ZIP 100M IDE / **Para / USB**	**$88/168/178**
ZIP 250M IDE/ Para/ SCSI	$198/248/248
ZIP 100M / 250M Disc	$13/25
JAZ 2G SCSI Int. / Ext.	$448/480
JAZ 1G / 2G Disc	**$115/120**
JAZ SCSI to Parallel Adapter	$80
LS120 Super FDD Int. / Ext.	$88/228
LS120 Disc	$13

Modems/Camara

Acer 56K V.90 Voice/Fax PCI (HW)	**$48**
USR 56K V.90 V/F/M Int. SW/ HW	$80/108
Creative WebCam Para / USB	**$98/88**
Creative WebCam Go USB	**$186**
Intel PC Camera (USB)/Pro	**$118/178**
Logitech QuickCam Express USB	$88

Spkr/ Mice/ KB/ Cases

USB Adapter / Hub	
PCI to USB Card	**$40**
USB 4 Port Hub	**$56**
Speaker	
120/ 260/ 800W + subwoofer	$15/25/38
Altec ACS 33 / 45 / 54 / 48	$68/98/108/178
Altec ACS ADA 305 / 880	$238/388
Creative 4 point FPS 1000/2000	**$108/218**
Creative Theatre # 1	$388
Yamaha MS 30 speaker/subwoofer	$90
Yamaha M28 speaker & subwoofer	$88
Mouse	
Logitech 2B/ 3B/ wheel mouse	$12/18/20
MS Intellimouse / USB	$28/32
MS Optical wheel mouse	$98
Keyboard	
Acer 107 / Fujitsu 8725	$13/20
Logitech Cordless KB & Wheelmouse	**$128**
Logitech iTouch Pro (KB & mouse)	$188
MS Natural Keyboard / USB	$38/68
Case & Fan	
AT 15" / 18" Case & 250W P/S	$38/48
ATX 17" / 18" Case & 250W P/S	$50/60
ATX 18" Case & 300W P/S	$90
Removable HDD Drawer	$28
External HDD/CD-Rom Holder	$80
Slot Fan / HDD Fan	$15/18

Printers

Color Printer	
Canon 1000SE/ 2100 (-$20/-$30)	$78/100
Canon 3000 (-$30)	$198
Canon 5100 / 8100 (-$0/-$30)	**$178/288**
Epson 440 / 670 (-$45/0)	**$118/138**
Epson 740 / 740i (-$75/-$75)	$148/188
Epson 760 / 750 (-$45/0)	$198/308
Epson 850/860/870(-$0/75/0)	$608/218/408
Epson 1160/1200/1270(-$75/0/0)	$540/678/578
HP 840 / 865	$258/360
HP 930 / 950 / 970	**$298/428/568**
HP 1120 / 1220 / 2000	$635/648/978
Lexmark Z11 / 3200	**$68/148**
Lexmark Z31 / Z51	**$178/248**
Laser Printer	
Brother 1030 / 1240DX	**$388/450**
Brother 1270N (Network Ready)	**$698**
Brother 4350 / 6800MFC	$558/748
Brother 2400C/ 2400CN Cass	$2668/3198
HP 1100/ 2100/ 2100TN	**$550/978/1378**
HP 1100A/ 3100C MFC	$698/568
HP 3150	**$828**
HP 4050 / N	$1598/2068
HP 4050 TN	$2298
HP 5000/ N	$2098/2998
HP 5000 GN	$3736
HP 8000/ N	$2968/3688
HP 8000 DN	$4330
HP 8100/ N	$3798/4158
HP 8100 DN	$4848
HP 4500/ N Color	$3538/4158
HP 4500 DN Color	$5308
HP 8500/ N Cass	$8368/9468
HP 8500 DN Color	$11998
Lexmark Optra 1625/ 1625N	$1458/1828
Lexmark Optra 1655/ 1655N	$1588/2028
Samsung 5100A/ 6050 ($50/-$50)	$298/358
Samsung 4500C MFC	$428

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ICI Book-PC

Ideal for Internet Surf & Office Workstation
(Amazingly Small- In Notebook Size)

- 64MB RAM
- 10.2G HDD
- 52X CD ROM
- Intel 810 100MHz MB
- 56K v90 Modem
- 10/100 Fast Ethernet
- 3D AGP Video
- 3D Stereo Sound
- TV out (composite & S-Video)
- Keyboard/Mouse/Speaker

Intel Celeron 500MHz CPU

$688

272x295x82mm

intel.
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NetworkSolution

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CD Writers

Creative 8432 Int. IDE Kit (8x4x32)	$328
HP 8250 Int. IDE Kit (4x4x24)	$208
HP 9310i Int. IDE Kit (10x4x32)	**$388**
HP 9210i Int. SCSI Kit (8x4x32)	$378
HP 9210e Ext. SCSI Kit (8x4x32)	$498
HP 8210e Ext USB Kit	$398
HP 820e Ext. SCSI/ PCMCIA	$498
Plextor 8432 Int. IDE CD-RW Kit	$338
Sony 8432 Int. IDE CD-RW Kit	**$288**
Yamaha 8424 Int. IDE/ Kit	**$318/368**
Yamaha 8424 Int. SCSI/ Kit	$338/388
Yamaha 8424 Ext. SCSI Kit	$548

CD-R/ RW Media

BASF/Sony CD-R (10pc)	**$12/18.00**
Prince EX CD-R (10/100pc)	$12/118
Prince 80min CD-R (1/10pc)	$2/18
BASF/Sony CD-Rewriteable	**$3.8/5.8**

ICI LinuxNetServer

Complete Server Solution:

- Connect all your computers to the Internet (using one account)
- Firewall solution included
- Website hosting (Intranet or Extranet)
- E-mail server: manage company e-mail
- Fax server: send and receive faxes
- File server: share large files easily
- Browser based setup: zero effort maintenance

Complete Hardware Solution:

- Pentium III 600MHz CPU
- 64 MB SDRAM
- 10 GB Hard Drive
- Dual 10/100 Ethernet card

Complete Software Solution:

- Newlix Server
- 25 client licenses

$1338

Purchase before June 30, 2000 and get VPN solution for FREE

NoteBok / MobileSolution

IBM

i1420	C-433	32M	4.8G	13HPA	24X	56K	$1898
i1460	C-433	64M	4.8G	14.1TFT	DVD	56K	$2648
i1460	C-466	64M	6.4G	14.1TFT	DVD	56K	$2838
A20m	PIII-500	64M	6G	12.1TFT	24X	56K+LAN	$3198
A20m	PIII 700	64M	12G	14.1TFT	24X	56K+LAN	$4448
A20p	PIII 700	128M	18G	15TFT	DVD	56K+LAN	$5968
T20	PIII-650	128M	6G	13.3TFT	24X	56K+LAN	$4798
T20	PIII-750	128M	12G	14.1TFT	DVD	56K+LAN	$6068

Acer

506DX	C-433	32M	4.8G	12.1HPA	24X	56K	$1598
514T	C-466	64M	4.8G	12.1TFT	24X	56K	$2068
514TXV	C-466	64M	6G	14.1TFT	DVD	56K	$2728
730TXV	PIII 450	64M	6G	14.1TFT	DVD	56K+LAN	$3228
732TXV	PIII 500	64M	6G	14.1TFT	DVD	56K+LAN	$3388
734TL	PIII-600	64M	12G	15TFT	24X	56K+LAN	$3898
736TLV	PIII-650	128M	12G	15TFT	DVD	56K+LAN	$4218
738TL	PIII-650	128M	18G	15TFT	24X	56K+LAN	$4218

HP HANDHELD PC

HP Jornada 540 (16M)/548 (32M)	$648/778
HP Jornada 680 (16M/56K)/690 (32M/56K)	$1160/1298
HP Jornada 820 (16M/ 56K/ 640x480)	$1330

3Com

PalmPilot IIIe/ IIIxe/ IIIc	$218/338/598
PalmPilot V/ Vx	$448/548

TOSHIBA

4270DVD	C500	64M	6G	14.1TFT	DVD	56K	$2998
4270ZDVD	C500	64M	12G	15TFT	DVD	56K	$3448
4280XDVD	PIII-450	64M	12G	14.1TFT	DVD	56K	$3638
4300	PIII-600	64M	12G	14.1TFT	DVD	56K	$4278
8100	PIII-600	64M	12G	14.1TFT	DVD	56K	$4298
8100	PIII-600	128M	18G	14.1TFT	DVD	56K	$4998

NoteBok Add-On's

PCMCIA CARD

Adaptec 1350 Mini SCSI Parallel Port Kit	$98
Adaptec 1460D/1480A SlimSCSI Kit	$170/245
Intel Pro100 LAN CardBus (Realport)	$128
Intel Pro100 LAN+56K Modem Cardbus Realport	$298
Linksys 10BT Ethernet PCMCIA	$78
MegaHertz 3CCFEM656 56K Modem+10/100	$308
Xircom Realport 56K V.90 + 10/100 BT	$398

PORTABLE CD-ROM & CD-WRITER

HP 120e 4X4X20 CD-RW PCMCIA/SCSI	$498
Micro Solution Bantam 24X CD ROM	$238
Micro Solution Bantam 24X CD w/Sound	$288
Micro Solution 4X4X20 CD-Writer/Dualport	$418/448

NOTEBOOK MEMORY & HDD & CASE

32/ 64/ 128M	$80-120/238 & up
Micro Solution Backpack 1.44MB FD	$168
IBM 6/ 12/ 16/ 25GB 2.5" HDD	$248/348/528/798
Toshiba 6.4/ 12/ 18GB 2.5" HDD	$248/348/525
Targus Notepac CN01/CN20	$41/30

Display Centre

Video Card

3D Labs Oxygen VX1 32M AGP	$318
Asus 3800 TNT2 32M/ w/3D Glasses	$198/268
Asus 6800 GeForce 32M Deluxe	**$318**
Asus 6800 GeForce 32M DDR Deluxe	$348
Asus GeForce 64M Pure/ DDR	$278/418
Asus V7700 GTS 32M DDR	$478
ATI Rage 3D 8M/ Xpert 128 16M AGP	$50/108
ATI Xpert 2000 32M AGP	$118
ATI Rage Fury 32MB/ 32MB Pro	**$168/178**
ATI Rage Fury MAXX 64MB 4xAGP	**$268**
ATI All-in-wonder 128 16M/ 32M	$228/318
ATI All-in-wonder Pro 32M	$360
Creative GeForce 32M/ Pro 32M	**$328/378**
Diamond Stealth III 16M / 32M	$88/108
Matrox Millennium G400 16M / 32M	$160/198
Matrox G400 32M Dual Head/ Max	**$238/288**
Matrox G400 TV 16M	$388
Voodoo3 2000/3000/3500 16M	$138/168/278

LCD Panel

NEC 1525V / 1525M 15"	$1298/1498
NEC 1525X/ 1525S 15"	$1768/2448
NEC 1810-1 18"/ 2010-1 20"	$4198/6398
Panasonic LC50 15"/ LC90S 18"	$1550/5678
Samsung 570S/ 570B	$1298/1398
Viewsonic L700 15"	$1328
Viewsonic VE 150/ VP 150	$1398/1650
Viewsonic VPA 150 15"	$1598
Viewsonic VG 150 15"	$1638
Viewsonic VPD 150/ VP 151	$1498/2098
Viewsonic VP181 18" (digital)	$4258

Monitors

AOC 17" 7Glr 26 / 19" 9Glr 26	$288/488
Acera/Preview 15" / 17" / 19"	$198/268/438
Mitsubishi 19" DP91/ 22" DP200	$798/1448
Mitsubishi 17" DP710S / 19" DP900U	$578/948
NEC 17" AS70/ A700+ / E750	$308/378/628
NEC FE700 / FE700M / FE750	**$398/468/498**
NEC FE950 / FE1250	$638/1268
NEC FP950 / P1250+	$798/1368
Panasonic 17" E70/ SL75 / PL70	$318/368/488
Panasonic SL95 19"/ P110 21"	$638/1168
Samsung 550S 15"/ 750S 17" .27	**$188/268**
Sony E200/ G200	$548/598
Sony 19" E400 / G400	**$788/868**
Sony E500 / G500 / F500	$1498/1598/2528

Viewsonic Monitors

E771	17"	.27mm	1280x1024	$318
E773	17"	.25mm	1600x1280	$378
EF70	**17"**	**.25mm**	**1600x1280**	**$388**
G773	17"	.26mm	1280x1024	$398
GS773	17"	.22mm	1280x1024	$428
PF77	**17"**	**.25mm**	**1600x1280**	**$528**
PF775	**17"**	**.25mm**	**1600x1280**	**$478**
PS775	17"	.25mm	1600x1280	$468
E790	19"	.26mm	1600x1280	$528
GS790	**19"**	**.26mm**	**1600x1280**	**$588**
PF790	**19"**	**.25mm**	**1600x1280**	**$658**
PF795	**19"**	**.25mm**	**1920x1440**	**$828**
PS790	19"	.25mm	1600x1280	$718
P810	21"	.25mm	1600x1280	$1188
P815	21"	.25mm	1800x1440	$1288
PF815	**21"**	**.25mm**	**1920x1440**	**$1288**

Network Products Centre

IntelProductLine

Network Adapter

Intel 8460B 10/100 Management Adapter	**$68**
Intel 8470B 10/100 Server Adapter	$138
Intel 8472B 10/100 Dual-Port Server Adapter	**$288**
Intel 8490 Gigabit Server Adapter	$928

Hub & Switch

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Vopt99 a fast disk defragmenter

Continued from page 38

to print out the topics you need. The online help offers useful recommendations, in the form of tips, for managing your hard disks.

A pie chart in the main window of Vopt99 shows the percentage of free space for the drive you have selected for defragmenting. While defragmenting, Vopt99 shows the progress graphically—much like the Details view in both Defrag and Speed Disk. It shows the amount of free space (in megabytes), and space occupied by cookies, downloaded files, and the Internet history of the selected drive. Also shown are the number of fragmented files and gaps.

Performance

The most notable feature of Vopt99 is its speed—especially if you defragment your hard disks often. This encourages frequent use. (Golden Bow suggests daily defragmenting!) Speed matters, because you should defrag when other applications are not running. Vopt's speed may be just the answer for system administrators. Vopt99 defragments FAT16 and FAT32 partitions.

An automatic scheduler allows you to schedule defragmentation. Vopt99 includes options for listing files that are fragmented, and for deleting cookies. It also has a feature for deleting temporary files you select from a list. I often find and delete files with the extension *.tmp but was surprised to find Vopt's list of temporary files contains files with many other extensions.

Windows NT does not come with a defragmentation utility, but you can now buy VoptNT (same price as Vopt99), which is capable of cleaning up NTFS and FAT 32 partitions. Golden Bow is also working on a Windows 2000 version of Vopt.

Golden Bow has been making defragmenters for 14 years, which is reassuring because this is a category of software where reliability really counts.

Customer support

Customer support for this product is via email. Registered users fill out a form on Golden Bow's Web site describing their problem, for which they receive an email response.

What I would like
to see in a future version

I would like the temporary file deletion list that shows the path, size and date of the temporary files. This would make it easier to choose which files to delete. I would also like Vopt to offer some options on how to optimize program files and directories.

Summary

Vopt is a fast defragmenter that will encourage you to use it. How many of us have systems slowed by fragmented files and hard disks cluttered with temporary files and cookies? Vopt99 deserves to be better known and frequently used to keep your computers optimized. My experience with this product is quite limited, and I make no claims about its safety, but Golden Bow says you will not lose data even if your computer crashes while defragmenting! ❑

Clint J. Metten, B.Com. is a freelance technical writer who writes user manuals and online help for software, hardware user manuals, and operation and maintenance manuals for machinery. He can be reached at techwrite@telus.net.

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[illegible]

Monsoon blows a 950 MHz storm

Continued from page 38

basic. The system ships with Logitech's Cordless Desktop I-Touch package, which communicates with the receiver unit via radio frequency, allowing you to use both mouse and keyboard from across the room without wires getting in the way.

On the software side, the Monsoon comes with Windows 98 Second Edition, as well as the Microsoft Plus Pack. For protection of data, McAfee's Virus Scan is also included. For those who want to take full advantage of the system's multimedia abilities, the machine also comes with a software DVD player for watching movies.

We benchmarked the machine using BAPCo's Sysmark98 test suite and the Monsoon achieved an overall Sysmark 98 rating of 357 (office productivity was 342 and content creation, 379), which blows well past any previous machine we've had a chance to benchmark. You can certainly see the difference in software DVD playback, which tends to be a bit jerky and pixellated on slower machines. The Monsoon handled playback admirably, with excellent picture quality throughout.

The $3,799 price tag doesn't include a monitor, though you can certainly add one to the Monsoon package (ours shipped with a Samsung SyncMaster 753 DynaFlat monitor, which adds another $349 to the package price).

For what you get, though, the high cost is justifiable. The Monsoon delivers top-notch performance, and gives us a pretty good idea of what kind of performance we can expect when we break the 1 GHz barrier.

—*Sean Carruthers*

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Photo album software, take three

Continued from page 42

tory and allowing you to double click on a subdirectory and catalogue or view any images there. Images in Photo Explorer can be enlarged, printed, dragged and dropped onto any programs that use pictures. In fact, that is the chief attraction of Photo Explorer—it allows you to see your images and get them into programs that use them. But that is all. It offers no Web publishing feature, ability to set images as wallpaper or to create slideshows—just quick viewing of your image assets.

ACDSee version 3.0

From: ACD Systems Canada
PO Box 750, Victoria, BC, V8W 2P9
http://www.acdsystems.com
Price: free (30-day trial); $74.95 (downloadable)
Pros: Adds ability to edit/modify image files, and makes it easy to add notes and keywords. Right-clicking on an image brings up most options of all systems.
Cons: A bit slower (320 vs. 410 images/minute) on cataloguing. Only handles image files—no video, sound, animation or other multimedia file types.
Out of the box: Easy CD-ROM install. Minimal manual does not prepare user for dealing with three programs.
Overall rating: 4.5 out of 5

ACDSee is available as photo album trialware from several download sites. A number of digital camera stores recommend it to their customers. ACDSee catalogues all the image files in a directory at a rate of about 320 images per minute, but once a thumbnail catalogue is created—as in Jasc's Media Centre and PhotoRecall—ACDSee can redisplay an album of thumbnails in about half a second. ACDSee automatically keeps that thumbnail catalogue up to date as images are later inserted or deleted from the directory. Media Centre and PhotoRecall both require the user to request a refresh. However, ACDSee does not allow users to move the thumbnail images around within an album, which the other programs do.

Using ACDSee to drag and drop one or more images into Web development tools like Front Page 2000 or Macromedia Dreamweaver was a cinch. This feature is most helpful when developing a Web page or a presentation, when you want to try out several images. Drag and drop certainly makes trial and error a lot less error prone. ACDSee takes this a step further by really taking advantage of the right-click functions of a two button mouse.

The pop-up menu is rich with possibilities—print, cut, move, copy, delete, rename, describe, and properties, which are also available in Media Center and PhotoRecall. But ACDSee has added such conveniences as Wallpaper (make an image your PC's background wallpaper), Convert (convert the image's filetype into one of a half dozen including GIF, JPG, PNG, and TIFF) and PhotoEnhance. ACDSee has a built-in image editor. Compared to Jasc's Paint Shop Pro it is underpowered (it lacks masks and layers and has minimal effects). But ACDSee has improved the latest version in two critical areas beyond the good cropping and sharpen/despeckle features.

First ACDSee's PhotoEnhancer allows very strong hue/saturation/lightness controls. Add in this brightness/contrast/gamma/white point/blackpoint sliders, and the most common photo retouching tools are available and in very good form in ACDSee. As well, the program has the ability to search the album of images for specific words used in the keywords list or anywhere in the description or comments fields, then display the filtered album of images. A slideshow of the resulting images is just a right mouse click away. However, users cannot add their own sounds (as in PhotoRecall) or other customizations (as in Jasc's Media Centre).

Conclusions

So how do you pick just one of these programs? Photo Explorer alone does not justify the price of Play's Gizmo MegaPak, but in combination with say the clock, calculator and calendar tools, Gizmos is a good buy for users who just wanting a simple way to see and move (drag and drop) their image/picture files into WordPerfect, PowerPoint, Dreamweaver or other applications into which they want to insert images.

Jasc Media Center and G&A PhotoRecall allow users to manage images with keywords, create several albums with overlapping images (albums of executive photographs may have some common images with a collection of corporate images), and search keywords within an album. PhotoRecall excels in producing output in slideshows, with sounds and a standalone slideshow viewer. Media Center supports more Web development filetypes—sounds, video, animations, plus the widest selection of image filetypes (more than two dozen).

ACDSee provides a wealth of capabilities beyond our baseline expectations but is not clearly superior to its main rivals from Jasc and G&A. So we leave it to readers to match their specific needs to the these four excellent photo album programs. Whatever your image cataloguing needs, there is now a wealth of solutions. ❑

Jacques Surveyer is a writer and consultant who can be reached at jhsurv@infoamp.net

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Upgrade Options:
64MB-128MB +$85 17" Viewsonic EF70 +$85
Canon BJC 1000 +$65 (After Rebate)

Intel Pentium III Deluxe Systems

Intel PIII 600/667/733/750/800 MHz CPU
Asus P3V4X VIA Chipset Motherboard
128 MB PC133 SDRAM Memory
Quantum 20GB 7200rpm Hard Drive
ATI Expert 2000 AGP Video, 32MB
Panasonic 1.44 MB Floppy Drive
Fujitsu 8725 Windows Keyboard
16" Deluxe Tower Case
Logitech Wheel Mouse
Creative 52X Int. CDROM Drive
Sound Blaster Live Value Sound Card
Deluxe Speakers W/Subwoofer

$1299 PIII 600 · **$1369** PIII 667 · **$1429** PIII 733 · **$1549** PIII 750 · **$1675** PIII 800

Options:
17" Viewsonic E771 .27/19" PF790 .25 $309/665

Celeron 466 System

$849
- 300*
Mail-in Rebate
$549 After Rebate

Intel 440 Chipset AGP M/B
64MB PC100 SDRAM
Fujitsu 6.4GB UDMA Hard Drive
ATI Rage II AGP Video, 8MB
Panasonic 1.44MB Floppy Drive
107 Key Windows 98 Keyboard
Samsung 17" 750S 1280x1024 Monitor .24(H)mm
16" ATX Tower Case w/230W P/S
Acer 40X UDMA CDROM Drive
16Bit 3D Stereo Sound Card
56K Int. Voice Fax Modem V.90
120W Amplified Speakers
Microsoft Trekker 2 button Mouse

OPTIONS
Lotus Smart Suite 2000 + $29
MS Windows 98 + $135
Canon 2100 USB Printer + $115

Intel Pentium III 600 MHz System

$1299
- 300*
Mail-in Rebate
$999 After Rebate

Intel Pentium III 600 MHz CPU
Asus P3V VIA Chipset M/B
64 MB PC133 SDRAM
15GB UDMA Hard Drive
3Dfx Voodoo 3 3000 AGP, 16MB
Panasonic 1.44MB Floppy Drive
Windows 98 Keyboard / 120WSpeakers
Samsung 17" 750S 1280x1024 Monitor .24(H)mm
14" ATX CSA Approved P/S Tower Case
Acer 40X UDMA CDROM Drive
16Bit 3D Stereo Sound Card
Microsoft Trekker 2 button Mouse

OPTIONS
56K V.90 Int. Voice Fax Modem + $29
64MB upgrade to 128MB + $85
Canon 2100 USB Printer + $115

Samsung Multifunctional Machines

MJ 4500C 5 in 1 Injet Color Machine
Printer + Scan + Copy
+ Fax + PC **$299**

SF5100P 6 in 1 Laser Machines
Printer + Scanner + Copier
+ PC Fax + Facsimile
+ E-mail Function
$449
- 50*
Mail-in Rebate
$399 After Rebate

Promotional Price while quantities lasts

Monthly Specials

3COM 3C905 100 NIC	$69
Fujitsu 6.4GB UDMA Hard Drive	$125
Fujitsu 20G UDMA Hard Drive	$185
Maxtor 30G (7200rpm) Hard Drive	$305
IBM 4G U2W SCSI Hard Drive	$199
Pioneer 10X DVD Drive	$205
Acer 640U Color Scanner	$125
Viewsonic E771 17" SVGA Monitor .27	$309
~~Viewsonic 19" PF790 Monitor .25~~	~~[illegible]~~
Samsung 15" 750B LCD	$1249
~~56K V90 Int. Voice Fax Modem USR~~	~~$75~~
USR 56K V90 Int. PCI Voice Fax Modem V90	$55
~~Altec Lansing ACS45.2~~	~~$80~~
Lexmark Z11 Color Printer	$95
~~HP 840 Color Printer~~	~~$229~~
HP 970 Color Printer	$545
Epson 760 Color Printer (After $45 Rebate)	$150
Brother HL 1030 Laser	$375
Brother 1250 DX Laser	$545
~~Brother 1240 DX Laser 12ppm~~	~~$445~~
Brother 1270N Laser 12ppm	$685

Monitor

Preview 17 /19"	$239/450
Aaeview 34e/77xq/G772	$200/279/299
Samsung 17" 750S .27mm	$265
Samsung 17" 753 DF .20mm	$355
Viewsonic E771	$300
Viewsonic EF70 17" .25mm	$389
Viewsonic PS775/PF775	$489/465
Viewsonic E790/PF790	$495/665
Panasonic SL75/SL95	$399/815
Sony G200/G400	$599/849
Sony E400	$735
NEC A570/FE700	$275/379

Scanner

Canon 630U	$175
Acer 320U /640U	$115/125
HP 3300C/5200C	$169/175
HP 5300C/6300C	$399/525
HP 6350C	$685
HP 6390C	$1145

Printer

Brother HL1030 Laser	$375
Brother HL1240DX	$449
Brother HL1250DX	$589
Brother HL 1270N Laser	$685
Brother MFC-4350MC	$545
Canon BJC 1000/2100USB	$65*/122
Canon BJC 5100	$189
Canon BJC 6100	$209*
Epson Stylus 440/670	$109*/139*
Epson Stylus 760/860	$150*/189*
HP 840C Color	$229
HP 950C Color	$429
HP 970C Color	$545
HP 1220CXI	$665
HP Laserjet 1100/1100A	$666/735
HP 5000N Laser	$3050
HP 8000N Laser	$3750
HP Laserjet 4050TN	$2289
Lexmark Z11	$95
Lexmark 3200	$129
Lexmark Z31 Color	$245

*After Rebate

Hard Drive

Maxtor 6.4/8.4GB	$125/139
Maxtor 15.0/20.0GB	$160/185
Maxtor 20.0/30.0GB 7200rpm	$235/305
Quantum 15/20GB 7200rpm	$190/245
Quantum 30GB 7200rpm	$345
IBM 30/40GB 7200rpm	$315/419
IBM 4.5GB U2W SCSI	$199
IBM 9.0/18GB U2W SCSI	$409/545
Fujitsu 6.4/10GB	$125/139
Fujitsu 20GB	$185
Fujitsu 27GB 7200rpm	$325
Seagate Cheetah U2W SCSI 9.1G	$450
Seagate Cheetah U2W SCSI 18.2G	$750
Seagate Barracuda U2W SCSI 9.1G	$389
Seagate Barracuda U2W SCSI 18.2G	$519
Quantum Atlas IV U2W SCSI 9.1G	$295
Quantum Atlas IV U2W SCSI 18.2G	$495

Modem

USR 56K V90 Int. PCI (Win)	$55
USR 56K V90 Int. PCI (Hardware)	$95
USR 56K V90 Int. ISA (Hardware)	$105
56K PCI Voice/Fax V90	$27
Acer 56K V90 PCI INT. Voice/Fax	$39
Diamond Supra 56K Int. Voice	$59

Multimedia

Acer 40X CD-Rom Drive	$34
Acer 52X CD ROM Drive	$69
Creative 52X CD-ROM Drive	$69
Panasonic DVD 8X Drive	$175
Pioneer DVD 10X Drive	$205
Pioneer DVD 16X Drive	$219
Toshiba DVD 5 KIT	$269
SB Compatible Sound Card	$19
SB 128PCI Sound Card	$40
Sound Blaster Live Value	$75
Creative PCWorks-FT SPK w/woofer	$105
Altec ACS 45.2 SPK w/Subwoofer	$80
Yamaha M28 w/Subwoofer	$120
GNT 5080A SPK w/Subwoofer	$18
Pair of 120W Speakers	$12

Backupdevice

Panasonic 8432 CD-Rewriter	$275
Acer 8432 CD Rewriter	$319
HP 8250i CD Rewriter	$269
HP 9110i CD-Rewriter	$325
HP 9310i CD-Rewriter	$385
CDR Media 10PK	$16.99
ZIP Drive 100/250MB Int.IDE	$79/145
ZIP Drive 250MB Ext. Parallel/SCSI	$259
ZIP Disk100MB	$14
Panasonic LS120 120MB Drive	$99
LS120 Disk	$15
HP Surestore 14G Ext.	$385
HP Surestore 5G Int. Tape Drive	$239
Sony 24G Ext. DAT	$1269
Onstream 30G Int. Tape Drive	$419

Network

3COM 3C905 10/100 NIC	$60
Intel 10/100 NIC	$60
Acer 10BT NIC	$19
D Link 10/100 NIC	$25

Video Card

Asus V6600 Pure 32MB	$329
Asus V6800 Delux, 32MB	$359
Asus V7700 Geforce-2, 32MB	$459
ATI Xpert 98(8M)/99(8M) AGP	$60/89
ATI Xpert 2000, 32MB	$115
ATI Rage Fury 32M AGP	$185
ATI All in Wonder 128, 16MB	$225
ATI All in Wonder 128Pro, 32MB	$375
ATI Rage Fury Max, 64MB	$295
3D fx Voodoo 3000 (Retail)	$199
3D fx Voodoo 3 3500 AGP 16MB	$260
Matrox [illegible]00 D H 32MB	$229

Motherboard

ASUS P5A/P5AB	$125/119
ASUS P3V4X	$169
ABIT VA6 VIA w/ Audio	$130
ABIT VT6X4 VIA	$155

Notebook

IBM
i1420 C433/32M/4.8G/24X/56K/12.1HPA...$1,789
i1482 C500/64M/12G/DVD/56K/14.1TFT $3,090
i1540 C433/64M/4.8G/24X/56K/12.1TFT....$2,449
390X PIII450/64M/12G/24X/56K/14.1TFT....$3,349
390X PIII500/64M/12.0G/24X/56K/15TFT ...$4,299
600X PIII650/64M/12G/DVD/56K/13.3TFT .$6,449

Toshiba
4070CDS C366/64/4.3/24X/56K/13.1DSTN..$2,050
4260XCDVD PIII450/64/12/DVD/56K/14.1TFT.$3,715
4270XDVD C500/64/6/DVD/56K/14.1TFT $3,149
4270ZDVD C500/64/12/DVD/56K/15TFT $3,835
8100DVD PIII650/128/18/DVD/56K/14.1TFT $4,800

Acer
517TE PII366/64M/4.1G/24X/56K/13.3TFT...$2,899
506DX C433/32M/4.8G/24X/56K/12.1HPA....$1,699
514TXV C466/64M/6G/DVD/56K/14.1TFT.... $2,849
723TXV PIII400/64M/10G/DVD/56K/14.1TFT $3,849

Fujitsu
E5140 C433/64M/6.4G/24X/56K/13.3TFT $2,499
E6530 PIII500/128M/10G/DVD/56K/14.1TFT $4,495

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3D AGP Video Card 4MB
Intel Celeron 466/500 $345/375
Intel Celeron 533 $395

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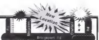

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PentiumIII Motherboard ATA66
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AGP Video / 48x CDROM
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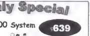
KeyBoard / Mouse / ATX Case
3D Sound / 140w Speakers
56K V.90 Voice/Fax Modem + One Month Free Internet



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BASF Blank CD w/Case	$1.49
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Keyboard + Mouse Combo	$18
Panasonic 8432 CDRW	$279
Wireless Wheel Mouse	$26
PCMCIA Network Card	$49

All systems are backed with 3 years installation labor/ 1 year parts warranty plus 1 month free Internet.

Home Officer

K6II-500 **$509**
K6II-550 $529

Super7 100mhz Motherboard
32M 100mhz SDRAM
8MB 3D AGP Video
[illegible]
48X CDROM / 1.44M FDD
Mouse / Keyboard
3D Sound / 140w Speakers
56K V.90 Voice/Fax Modem

Athlon K7 Master

K7-650 **$1079** lease $39/mth
-700 $1119
-750 / -800 $1169/ $1269
Gigabyte K7 Motherboard
128M 133mhz SDRAM
32M AGP Video Card
[illegible]
48X CDROM / 300w ATX Case
Logitech Mouse / Keyboard
3D Sound / 140w Speakers
56K V.90 Voice/Fax Modem

PIII Partner

Celeron 500 **$719**
-533 / -566 $729 / $779
P3 550E / 600EB $889 / $899
-667EB / 733EB $919 / $1009
Pentium III 133mhz Motherboard
64M 133mhz SDRAM
ATI 8MB AGP Video Card
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Logitech Mouse / Keyboard
3D Sound Card / 140w Speakers
56K V.90 Voice/Fax Modem

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-733EB / 800EB $1239 / $1479
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32MB AGP Video Card
13G 7200rpm HDD / 1.44M FDD
48X Ultra DMA CDROM
3D sound Card / 140w Speakers
Logitech Mouse / Keyboard
56K V.90 Voice/Fax Modem

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P3-733 **$2629** lease $95/mth
-800 $2869
Asus PIII 133mhz Motherboard
256MB 133mhz SDRAM
Asus V6800 GeForce 32M AGPx4
40G 7200rpm HDD / 1.44M FDD
10X DVD / Panasonic 8432 CDRW
Sound Blaster Live value
Altec 54w Subwoofer + 4Speakers
Logitech Wireless KB & Mouse
USR 56K V.90 Voice/Fax Modem

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CPU

OverClocker's Favorite CPU Cooler	29
Asus 370 to Slot1 CPU Adapter [illegible]	29
Celeron 500 / 533 / 566(II)	149 / 169 / 209
100mhz PIII 650E / 700E	309 / 419
133mhz PIII 600EB / 667EB	319 / 339
133mhz PIII 733EB / 800EB	429 / 689
133mhz PIII 866EB	999
K6II-450 / 500 / 550	85 / 95 / 115
Athlon K7-550 / 650	159 / 249
Athlon K7-700 / 750	289 / 339
Athlon K7 800 / 850	439 / 589
Athlon K7 900 / 950	819 / 989
Intel Pentium 233mmx	79

MEMORY

	16M	32M	64M	128M	256M
100Mhz SDRAM		49	89	175	349
133Mhz SDRAM			99	185	359
72pin EDO	65	105	185		

MOTHERBOARD

ATA66 PCI Controller Card	45
Super7 (AT) + Creative Sound [illegible]	105
Super7 + 8M Video + Sound + Modem	129
Asus Super7 P5A (ATX)	125
Asus Super7 P5AB (AT)	119
Asus K7V Athlon KX133 ATA66	225
ABIT KA7 Athlon KX133 ATA66	226
Gigabyte 7VX Dual Bios KX133 w/Audio	189
PIII i810 + AGP + Sound ATA66(ATX)	129
Asus P3V4X 133Mhz ATA66	159
Asus CUV4Xm 133Mhz ATA66 [illegible] w/Audio	159
Asus P3BF [illegible]	179
Gigabyte 6VXE+ 133Mhz ATA66	109
Gigabyte 6VX4X [illegible]	139
Gigabyte 6VX7-4X 133Mhz ATA66 [illegible]	139
AOpen AX63Pro / AX64 133Mhz ATA66	10? / 135
ABIT BP6 Dual CPU ATA66	189
ABIT VA6 133Mhz ATA66 w/Audio	119

HDD / LS120 / ZIP

5400rpm	6G	8G	10G	15G	20G	30G	40G
Fuj/Max	119	139	149	169	189	249	349

7200rpm	10G	13G	15G	20G	30G	40G
Max/Fuj	166	179	169	239	299	389
QTM/WD	179		169	249		

LS120 2x 120mb Super Drive / Disk	99 / 14
Zip 100MB Int IDE Drive / Disk	85 / 13
Zip 250MB Int IDE Drive / Disk	159 / 25

VIDEO

Asus Geforce 64M 256 / DDR pure	269 / 399
Asus V6600 / V6800 GeForce 32M	289 / 339
Asus V7700 GTS DDR 32M pure	459
Asus V3800 TNT2 / Pro 32M pure	129 / 179
Asus V3800 TNT2 Ultra 32M pure	199
Creative Annihilator Pro DDR 32M	389
Creative Geforce II 64M	call
Matrox G400 Dual VGA 32M / 16M	239 / 169
Diamond Savage4 32M / 16M AGP	89 / 65
Sniper TNT2 32M AGPx4 / Pro	109 / 129
Sniper TNT2 32M AGPx4 TV in&out / out	145 / 129
ATI Xpert 98 8M / 128 16M AGP	55 / 119
ATI Xpert@play PCTV 8M AGP PCI	69 / 89
ATI Fury Pro 32M / Maxx 64M AGP	189 / 319
ATI All-in-Wonder 128 16M AGP PCI	209 / 235
ATI All-in-Wonder 128 32M AGP / PCI	289 / 309
ATI All-in-Wonder PRO 128 32M	369
ATI TV-Wonder Tuner & Capture Card PCI	89
3dfx Voodoo3 2000 16M AGP / PCI	129 / 139
3dfx Voodoo3 3000 16M AGP / TVout	179 / 199
PCI 8M 3D S3 Trio	59
Logitech Quickcam Exp / Web use	89 / 119

AUDIO

Crystal 3D Sound Card ISA / PCI	17 / 19
Sound Blaster Ensoniq / PCI 128	31 / 44
Sound Blaster Live value / Platinum	69 / 268
Multimedia Speakers	8 & up
GNT5000A Subwoofer + Speakers	52
Cambridge Subw + 4 Speakers [illegible]	109
Altec Lansing ACS33w / 45w / 48w	59/ 89/165
Altec ACS54w Subw + 4 Speakers [illegible]	95
Microphone / Headset Mic +Vol Control	9 / 12

CD-ROM / CDRW / DVD

48X Liteon / Aopen CDROM	56 / 58
52X Creative / 50X Asus	63 / 69
Adaptec EZ CD Creator	19
Panasonic 8x4x32x CDRW IDE	279
Creative 8x4x32x CDRW IDE	319
Yamaha 8x4x24x CDRW IDE / SCSI	339 / 399
Sony 10x4x32x CDRW IDE	299
HP 8x4x32x CDRW [illegible]	329
HP 10x4x32x CDRW [illegible]	379
8X Asus DVD	179
16X Pioneer DVD	219
Sigma Hollywood DVD Decode Card	call
Blank CD Recordable / Rewritable	1.49 / 3.5
Blank CD Spindle 50pcs / 100 pcs	59 / 99
80min Blank CD Recordable	2.5 & up
Platinum 8xRecordable CD	15 /box

MODEM / NETWORK

Motorola 56K V.90 V/F WinModem PCI	25
AOpen 56K Voice Modem ISA / PCI	59 / 45
USR 56K WinModem / Voice PCI	49 / 55
USR 56K HardWare Modem / Voice PCI	79 / 89
PCMCIA 56K V.90 Modem	79
Surecom Ethernet 10mbps / 100mbps PCI	15 / 22
AOpen RJ45&BNC Combo 10mbps PCI / ISA	19
AOpen Fast Ethernet Card 100/10mbps PCI	23
D-Link 530TX 100/10mbps PCI	23
3COM 3C905 100/10mbps PCI Wake-on-lan?	89
Surecom PCMCIA Network Card 10mbps	49
Surecom PCMCIA Network Card 10/100mbps	79
Surecom HUB 5 / 8 Port 10mbps	38 / 49
Surecom HUB 5 / 8 Port 100/10mbps	89 / 139
USB HUB 4 port [illegible]	49
Network Cable 10/ 20/ 30/ 50	7 / 10 / 15 / 19

MONITOR

15"

AOC	.28 Low Radiation	179
Samsung / Optiquest		199 / 219
ViewSonic / Sony		238 / 290

17"

AOC	.28 7GLR	259
ViewSonic	.27 E771 / .25 EF70	315 / 389
	.28 PF775 / .25 PS775	479 / 489
	.27 M70 / .25 GS773	409 / 419
Optiquest	.27 Q71 / .28 Q75	309 / 409
Sony	.24 G200 / .24 E200	380 / 519
Samsung	.27 750S / .24 753DF	279 / 359
	.28 700NF	429
NEC	.25 FE700 / .27 A870	389 / 329
Panasonic	.27 E70i / .25 PL70	309 / 479

19"

AOC	.26 9VLR	375
ViewSonic	.26 E790 / E790Black	519 / 569
	.26 GS790 / .25 PS790	599 / 716
	.25 PF790 / .25 PF795	699 / 799
Optiquest	.27 Q95	499
Sony	.25 G400 / .25 E400	629 / 749
Samsung	.26 900SL .24 950P	539 / 499

PRINTER / SCANNER

Canon BJC 1000 / 2000 Color	call
Epson Stylus 440 / 660	149 / 199
Lexmark Z11 / Z31 / 3200	99 / 175 / 145
Okipage 8W Digital LED Printer 8ppm	239
Samsung 5100A 8ppm 4MB 1200dpi	329
Brother Laser HL 1030	369
Acer 320S / 640U / 640BU	139 / 129 / 169
Acer 620UT USB Transparency Capable	209

Keyboard & Mouse

Keyboard + Mouse Combo	18
Color keyboard + Mouse transparent	28
Internet Keyborad / Logitech	19 / 35
Chinese Keyboard (blue / white)	19
Fujitsu 8725 Keyboard	18
Logitech Cordless KB&Mouse	128
MS Natural / Internet Keyboard*	35 / 29
MS Wheel Intellimouse*	24
Wireless Mouse with Wheel	26
2B Serial / PS2 Mouse	8
Wheel Mouse / Logitech	12 / 18
TrackBall Mouse / Finger TrackBall	28 / 2
USB Mouse	19
PS2 ↔ AT Keyboard Adapter	5
Keyboard Drawer	18

Cable

Cables for Monitor/KB/Mouse/Modem etc	7
Magnetic Shield Moniter Cable	19
Printer Cable (Bi-Directional) 6' / 15'	7 / 15
IDE Cable 18" / 33" / ATA66	3 / 6 / 9
SCSI Cable with 3/ 5/ 7 Connecter	6 / 8 / 12
SCSI External Cable	19 & up
Power Cord / Split / Bar	2 / 3 / 8
5xBNC RGB VGA Cable	25

Others

Ethernet Cable Crimp tools / Tester	26 / 78
486 / Pentium / AMD CPU fan	9 / 8
Dual Fan CPU Cooler for K7 CPU	25
Slot Fan ideal for OverClocking	15
CPU Cooler ideal for OverClocking	15 & up
Heatsink Compound / Thermal Paste	2
Case Fan 3pin / 4pin Ball Bearing	15 / 12
HDD Cooler / HDD Ventilator	17 / 29
Mobile Rack w/ fan / ATA66	17 & up / 35
Mounted Frame for FDD / HDD	6
Switch Box for Printer 2 / 4 port	15 / 19
Switch Box for Monitor 2 / 4 port	19 / 19
Switch Box for System 2 / 4 way	28 / 39
Printer Card / Enhanced	16 / 24
Monitor Screen Filter 15" / 17"	26 / 30 & up
SCSI Card DC315U / DC390F	55 / 128
SCSI Adaptec 2906 / 2930u	79 / 139
15~25 Case AT / ATX Various Styles	28&up
Power Supply AT 230w / 250w	25 / 30
Power Supply ATX 250w / 300w	35 / 50
Anti Static Wrist Strap	8
PS2 Port / USB Port for Motherboard	6 / 16
PCI to USB Converter Card	45
MS Windows98 Upgrade 2nd Edition	129
MS Windows2000 Professional*	199
Norton Anti Virus 2000	38

More than *just* a mouse or keyboard

When it comes to interacting with your computer, there's a lot more to consider than simply point and click

By Ross MacDonald

Largely taken for granted, as we are dazzled by more glamorous peripherals, the lowly keyboard and mouse—or trackball—are along with the monitor the devices with which we become most intimate in the course of our computing. The advent of the Internet, as well as the corresponding expansion of tasks we now regularly do on our computers has led many of us to consider more seriously the comfort, convenience and design of these most primary input devices.

Computer manufacturers too have been looking closely at the mouse and keyboard in attempts to balance optimum comfort and usability with reasonable cost. In terms of design, you now see numerous shapes and sizes of mice and trackballs, largely to accommodate individual taste and comfort but also because different shapes and sizes are best suited to different tasks.

Technologically speaking, there has been a push toward cordless devices as well as the more recent implementation of "force feedback"—a technology that actually communicates physical sensation to match what's happening on screen. While force feedback was immediately adopted by gamers (steering wheels that let you "feel" the bumps in the road, or joysticks that recoil when shooting) the technology is slowly being adapted to standard productivity applications too, so that we can feel when the pointer is over an icon or hot spot.

"Logitech is currently putting a very strong emphasis on cordlessness," says Brian Richie, a representative for this major manufacturer of mice, trackballs, keyboards and gaming paraphernalia. "We feel that the fewer wires you have on your desk the better, and radio input [Logitech's wireless devices operate using a radio frequency or RF signal] devices like keyboards, trackballs and mice certainly help to keep the work area clear." Apparently, the public likes the idea of wireless devices too. "If you look at cordless in general and the reason there's such a wide variety of cordless products, it's simply because people want them. That's evident both by sales and the feedback coming in to the industry," he says.

Mice come in various shapes and colours to appeal to a broad range of tastes. Trackballs offer even more variety: button and ball placement as well as body shape can create completely different computing experiences. I use a large balled Logitech Trackman Marble FX in which the ball is controlled by my index finger and the buttons pressed by thumb and ring finger. Things get a bit confusing when I visit a friend who uses a small-balled trackball controlled by the thumb with the buttons falling under my index finger and other digits.

Game controllers, including steering wheels, were some of the first PC devices to incorporate force feedback technology

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Microsoft Natural Keyboard Pro

However, there is some pragmatism behind many of these design variations. In the case of large versus small trackballs, larger, heavier balls are easier to manipulate because they have greater surface area and momentum. This makes them well suited to applications like graphics or multimedia. The smaller version work very well in less pointer-intensive contexts like spreadsheets and word processing. Button placement, on the other hand, is strictly a matter of taste, although you'll find most manufacturers try to make the button locations as natural as possible.

Compaq Computer Corp. operates an internal consulting group called the Human Factors Lab that studies the efficiency and usability of product design. One interesting thing the lab has discovered is that the drivers and settings for input devices are at least as influential as the physical design itself, says Meera Manahan, who manages the lab.

"Ergonomics is one of those very flexible words in our vocabulary right now," she says, "but we do quite a lot of testing on input devices at the Human Factors Lab to look at many different characteristics: everything from auditory feedback and tactile feedback to the colour and how the device will help you input more accurately and quickly. But, we also go to great pains to figure out the optimal driver settings for these devices—pointer speed and acceleration, keyboard key travel and feedback, even audio feedback when clicking or typing. We've found that those things influence the usability of an input device over time as much as the hardware design itself, if not more."

It's a similar story at Microsoft Canada, according to Natalie Tehrani, marketing manager for hardware. "The software that comes with mice is becoming more and more sophisticated. We've found research showing that heavy computer users like to customize their mouse settings, for example. So you'll now find there is more possibility in the software to customize settings and alter features to suit individual needs and tastes. There's even a feature now that will tell you how far your mouse has travelled. People like stuff like that."

Clickety-clack

Despite being restricted by the ubiquitous QWERTY layout, keyboards too are subject to a great deal of variety, with twists, turns and undulations to the keyboard body that tacitly claim to relieve wrist strain, and tilt features and wrist rests added for comfort.

However, in addition to the logical introduction of cordless keyboards—which are now quite common—more recent innovations have focussed on greater interactivity with software through keyboard shortcuts.

"When we did research on how people are using their computers today and what they are using them for, we found that the PC environment was changing, mostly because Internet use is very high," says Tehrani. "We also found that multimedia use of computers is growing trat as people watch DVD or listen to music from their CD-ROM player while working, or any number of things."

Out of the research came products like the Natural Keyboard Pro with built-in Internet buttons for forward and back, or favourites, plus programmable hot keys for one-button email or application launching.

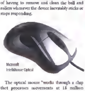
Microsoft's current line of keyboards also includes single-button access to multimedia functions like play, pause, and volume. These controls are in the form of an additional row of clearly marked buttons across the top of the keypad, above the standard function keys. Logitech employs the same concept in its new keyboard models but uses symbols (which the user must decipher) instead of words to indicate the function of each button.

Further differences, however, indicate just how many choices are now available to the shopper. Microsoft's Natural Keyboard Pro connects either through the standard PS/2 port or by USB. This model also incorporates two additional USB ports so users can attach additional devices without having to crawl under their desks to access ports at the back of the PC.

Logitech's Cordless Desktop Pro includes a cordless wheel mouse in the box and adds software for MP3, which is tied directly to the keyboard's multimedia buttons.

Teaching mice new tricks

When Microsoft introduced the IntelliMouse optical, it dispensed with the ball. This mouse can be moved over any surface (no mouse pad required) with the optical laser monitoring the movement and translating it into smooth on-screen pointer motion. With no moving parts, optical devices of all stripes are guaranteed to last longer while eliminating the frustrations of having to remove and clean the ball and rollers whenever the device inevitably sticks or stops responding.



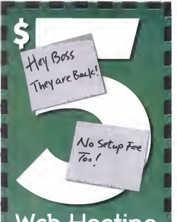
Microsoft IntelliMouse Optical

The optical mouse "works through a chip thet processes movements at 18 million instructions per second, which gets rid of the ball," according to Tehrani. "With focus groups we found that people were getting really frustrated with the ball in their mice: they were banging it on the table; it was getting gummed up, they were losing precision over time because of heavy use. So we see people moving toward optical [mice]. The adoption rates have already been huge. The general trend, the larger trend, is definitely toward optics." Tehrani intimates that Microsoft is working on integrating the technology into trackballs next.

"Everybody likes optical," says Logitech's Ritchie. "Not because it works better, but because it's cool. Logitech's line on optical is thet we recognize a market out there, so we are adapting to those market needs. You'll see that [Logitech optical devices] in the future."

Optical is not the only new variation on input devices. Another technology, which

Continued on page 57



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- Uses RF cordless technology
- Ergonomic twists and turns (on keyboard and mouse)
- Built-in scrolling/zooming wheel on mouse.
- Built-in wrist rest on keyboard
- Four dedicated Internet shortcut buttons.
- Seven dedicated multimedia shortcut buttons.
- One-touch "suspend" of your computer system.

Microsoft Natural Keyboard Pro

- PS/2 and USB connectivity
- Ergonomic twists and turns
- Built-in wrist rest.
- Eight dedicated Internet shortcut buttons.
- Seven dedicated multimedia shortcut buttons.
- Separate dedicated My Computer and Calculator shortcut buttons
- One-touch "suspend" of your computer system
- Two built-in USB ports

Microsoft IntelliMouse Optical

- Optical technology means no moving parts
- Works on virtually any surface (no mouse pad required)
- Comfortable, ergonomic design
- Can be used with left or right hand
- Scrolling/zooming wheel.
- Programmable buttons for common tasks

Microsoft Cordless Wheelmouse

- Uses RF technology
- Larger comfortable body design
- Can be used with left or right hand
- Scrolling/zooming wheel.

Logitech WingMan Force Feedback Mouse

- Tactile feedback from display
- Ergonomic body design
- Joystick and wheel emulation drivers.
- Includes three games (Heavy Gear II, Chuntz, Railroad Tycoon II)

Logitech Trackman Marble FX

- Extremely comfortable ergonomic design
- Built-in wrist rest.
- Larger heavier control ball for easy pointer control.
- Additional button to convert ball movement to scroll or zoom functions.

—Ross MacDonald

Philip K. Dick forever

NB—*Blade Runner* and other works by this science fiction master continue to attract new generations of readers, and this site, philipKdick.com offers a provocative mix of reference and review to keep his readers informed and amused. Online here are the Encyclopedia Dickiana, E Dika and PKDweb. Five years in the making, the site includes extensive reference material on PKD's novels, short stories and other writings, original PKD-inspired essays, fiction and analysis. Another fun feature is the "news" where events that really happened but seem inspired by ideas in Philip K. Dick novels are posted, including research on "god" particles, flocks of dead birds falling out of the sky and image manipulation by CBS Evening News. Also included is the latest on the Dick novel *Minority Report* in production by Steven Spielberg starring Tom Cruise.

http://www.philipkdick.com/

More than just a mouse or keyboard

Continued from page 55

actually adds dimension to your computing experience, is making its way into stores is force feedback.

Though this technology, as noted above, has been implemented mainly in gaming peripherals, non-gamers can also enjoy its enhancements as mice incorporating force feedback are now available. These mice will "knock" and "vibrate" to deliver physical sensation when the pointer hits a relevant spot on the display.

Unfortunately, in order to accomplish this, the mouse itself has to be harnessed to a dedicated platform that houses all the mechanics in a relatively bulky form factor. Mouse movement is highly restricted too, but it does work surprisingly well.

"We can look forward to a lot of different products that will incorporate different technologies to allow people to use their mouse or joystick in ways above and beyond how they've used them in the past," says Ritchie. "If, for example, a Web site is marketing cloth, a force feedback mouse will enable you to actually feel the different types of cloth. There are quite a few Web sites out there getting into this now. It's not just a fantasy." ❑

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Keep it flat!

Flat-panel monitors were once considered too expensive for anything but specialized applications. While the prices are still higher than cathode ray tube designs, you can now almost say LCD and affordable in the same breath.

By Dave Chapelle

When science writers first began writing about on flat-panel displays, some predicted they would become the wall art of the future. Imagine hanging a flat panel display on your living room wall, connecting a small computer somewhere out of the way, and displaying your favourite images. You could change the art to suit your mood or to impress your guests. By loading a fish tank screen saver, you could enjoy a giant aquarium without ever having to feed the fish or clean the tank.

The wall sized televisions Ray Bradbury described in his 1953 novel *Fahrenheit 451* suddenly seem not so futuristic. While it's true that a few devices have come along that use flat screens for more artistic purposes (Sony's electronic picture frame comes to mind) the most common applications are as replacements for the cathode ray tube (CRT) computer monitors.

The advantages of flat-panel displays over traditional CRT monitors are clear. Flat panels take up less space on a desktop, emit hardly any radiation, and have no difference between stated size and real viewing area. For many users they are easier to look at, which results in less eye fatigue.

Taking up less desktop area is a distinct advantage flat panel displays have over cathode ray tubes. ATX cases, which are found on most new computers, are wider than the AT cases they replace. Add speakers and a 17-inch monitor, and free desktop space disappears. Flat-panel displays require much less room.

With flat panel monitors, you also get all the screen real estate you pay for. A 15-inch CRT monitor has roughly only 34.5 cm (13.5 in.) of actual viewing area. A 17-inch CRT monitor has only about 40 cm (15.75 in.) of viewing area. Flat-panel displays have no such discrepancy. For a 15-inch flat panel display, the viewing area is the full 15 in.

Begone, bad old rays!

Two major concerns users have with CRT monitors are flicker and radiation. In a CRT monitor, electrons are "beamed" many times a second at the back of a screen coated with phosphors. Light is created when electrons strike the phosphor coating, and between passes of the beam the phosphor patches dim somewhat, creating flicker. Staring at such a monitor for long periods of time can result in eye fatigue.

This is less of a problem with TFT displays, because there is no residual fading between refresh cycles—each pixel element is either on or off. What can be slightly problematic is the analogue-to-digital conversion necessary when using a flat-panel monitor with an analogue graphics card. Because the analogue signal isn't as precise as a digital signal, the TFT monitor sometimes has to decide which one of two pixels is the best match, and if it chooses differently between refresh cycles, a bit of flicker can result. Because of that, the technology isn't quite perfect yet, but this concern should disappear as more people move towards the digital flat-panel technology on the graphics card end.

Some users worry about the electromagnetic and radio frequency emissions from CRT monitors. CRT manufacturers have already done a lot to address these issues, with shielding technology that eliminates much of the radiation. There are still some professions, like science and medicine, where any amount of radiation is unacceptable, and the TFT monitor fits in nicely.

The good new rays

Flat panel displays are very different. Instead of creating light, they control it. Flat-panel displays emit only miniscule amounts of light radiation from the liquid crystal cells. Users can sit as close as they like without fearing for their eyesight, and use less power in the process, to boot.

Liquid crystals are compounds that flow like liquids while maintaining a crystalline order. Liquid crystal molecules control the direction of polarized light according to how they are aligned. By applying an electric field, the alignment of these molecules can be controlled.

There are two types of flat-panel display: active matrix and passive matrix. In a passive-matrix display horizontal and vertical electrodes activate the pixels. In an active-matrix display silicon thin film transistors (TFT) are used to activate each pixel. The transistors supply the necessary control that allows the liquid crystals to rotate and either pass or block light. Active-matrix TFT flat panel displays are best for desktop computers because they have better resolution, a brighter display, and a wider viewing angle.

Sandwiched between two glass panels that are polarized on the exteriors, the liquid crystals act as light switches, blocking light or allowing it to pass depending on the rotation attitude of the cell. Light emanating from behind the display passes through the first polarizer and is rotated with the alignment direction of the liquid crystal. As the light reaches the second polarizer, it can be passed or blocked, depending on the attitude of rotation. Transparent conductors on the inner surface of the glass plates are used to control the electric field on the cell, and thus the direction of the liquid crystal molecules.

The construction of liquid crystal displays (LCDs) means that lines can only be as close together as the actual pixels. This is known as convergence. A vertical line consisting of sections of red, green, and blue will be straight, but not perfectly aligned. Because each colour pixel is physically right next to the others, the different coloured lines will not touch exactly end-to-end. This is only noticeable upon very close inspection during certain uses. All of the monitors sampled in this month's Test Lab had excellent vertical convergence with no noticeable horizontal discrepancies.

Between two and three million transistors make up each active-matrix LCD TFT screen. When juggling this many tiny items there are bound to be defects. Even the most stringent quality control standards are going to let some microscopic defects through the manufacturing process. As these defects show up directly on the user's screen, more care is required when choosing a display.

Consumers are used to high quality control standards for CRT monitors. We buy them, uncrate them, and expect that they will perform properly. When purchasing an active-matrix flat-panel display monitor, however, it's a good idea to try to view the specific monitor you will be buying before taking delivery.

In the eye of the user

The best way to determine which product suits your needs is to examine as many displays as possible. Beauty really is in the eye of the beholder. When discussing colour, brightness, sharpness, and tint, opinions vary. One person's beige is another's taupe, and what appears turquoise to some is aquamarine to others. For years I drove a green truck that was registered as teal, but I'd like a dollar for every person who referred to it as blue. For this reason our testing can only be subjective. Since you are the one who has to look at it, you should be the one to decide which monitor you want.

I sometimes borrow a notebook computer with an active-matrix TFT screen. It feels like I can stare at that screen all day, which makes up for the smaller keyboard. When in front of a 15-inch CRT monitor I am constantly looking away to rest my eyes. However, as everyone's eyesight is different, not everyone will feel the same way. Many users find LCD displays more difficult to look at than CRTs.

Supply and demand

Why haven't flat panels completely usurped the market from CRTs? Is it because customers consider the prices too high? Or are the prices too high because demand is currently low? Flat

FLAT-PANEL MONITORS

	Apple Studio Display	Hewlett-Packard Pavilion FX70	IBM T55A	KDS Radius S-3F	LG Electronics 500LC	NEC MultiSync LCD 1525V
Dimensions (WxHxD) cm	39.9x49.9x24.9	41.8x39.4x21.2	41.3x38.1x20.4	40.4x38.7x20.3	40.5x36.2x18.2	37x32.5x15.1
Weight (kg)	5.5	8.2	6.5	5.55	5.6	4
Maximum resolution	1,024x768	1,024x768 85 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 60 Hz
Recommended resolution	1,024x768	1,024x768 75 Hz	1,024x768 60 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 60 Hz
Pixel pitch (mm)	NA	0.297	0.297	0.297	0.3	0.3
Horizontal viewing angle (degrees ±)	60	NA	NA	70	60	55
Vertical viewing angle (degrees ±)	4	NA	NA	60\55	45	40
Tilt angle down (degrees)	10	5	1	NA	5	5
Tilt angle up (degrees)	45	35	4	NA	30	3
Power consumption (Watts)	35	42	30	30	40	25
Contact	800-[illegible]38-9686	800-387-3867	800-465-7999	888-537-9001	888-542-2623	800-632-4636
Web site	www.apple.ca	www.hp.com	www.can.ibm.com	www.kdscanada.ca	www.lge.ca	www.nectech.com
Warranty	3 years	1 year	3 years	3 years	3 years	3 year
Price	$1,949 SRP	$2,237 street	$2,119 SRP	$1,502 street	$1,499 SRP	$1,549 ESP

	Phillips 150B	Princeton APP 520	Samsung 870 S	Samsung 870 P	Sceptre ST 18D	Tatung L5CBS	Viewsonic VP151 ViewPanel
Dimensions (WxHxD) cm	40.2x41.8x17.6	38.8x40.6x20	38.5x45.2x17.8	38.5x40.6x[illegible]4	33.9x33.9x1[illegible]	39.8x37.5x19.5	41.6x31.1x23.9
Weight (kg)	5.5	4.79	5.7	5.7	3	4.8	8.5
Maximum resolution	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,024x768 75 Hz	1,280x1,024 60 Hz
Recommended resolution	1,024x768 60 Hz	1,024x768 75 Hz	1,024x768 60 Hz	1,024x768 60 Hz	1,024x768 70 Hz	1,024x768 60 Hz	1,024x768 60 Hz
Pixel pitch (mm)	0.297	0.297	0.297	0.297	0.29	0.297	0.297
Horizontal viewing angle	75	60	55	5[illegible]	40	60	80
Vertical viewing angle	50\55	55	60	60	10\30	45\55	80
Tilt angle down (degrees)	2	5	5	5	15	0	5
Tilt angle up (degrees)	32	27	20	20	15	20	15
Power consumption (Watts)	38	42	50	56	38	NA	35
Contact	800-479-6696	800-747-6249	800-726-7864	800-726-7864	800-788-2878	800-872-2850	800-888-8583
Web site	www.pcstuff.philips.com	www.princetongraphics.com	www.samsung-monitor.com	www.samsung-monitor.com	www.sceptre.com	www.tatungca.com	www.viewsonic.com
Warranty	3 years	3 years	3 years	3 years	3 years	3 years	3 years
Price	$1,699 ESP	$1,649 SRP	$1,799 SRP	$1,999 SRP	$1,640 SRP (converted)	$1,499 SRP	$2,379 SRP

panel prices have not come down as much as industry analysts once predicted. A good quality 17 inch CRT monitor with a three year warranty can be purchased for a street price of less than $400, while active matrix TFT monitors have yet to fall below $1,400, and some exceed $2,000. Three excellent CRT monitors can be purchased for the price of one excellent LCD. This explains some of the weak demand.

The manufacturing process also contributes to the higher cost of flat panel displays. The difficult business of aligning more than two million microscopic liquid crystal and transistor cells correctly results in a portion of units not meeting specifications. Monitors that do not meet strict quality control standards must be scrapped. If manufacturing processes improve we can expect the yield of good units to increase. This should allow manufacturers to relax prices.

Why haven't prices come down as expected? We asked representatives from the major manufacturers.

Dave Walsh, vice president of sales and marketing for NEC Technologies Canada, says the radical price reduction of first quarter 1999 will not be repeated in the near future. He says improvements in glass production over the past three years increased the yield of quality flat-glass panels. He expects there will be what he calls a "natural price erosion" of 10 to 20 percent by monitor manufacturers over the next year or two. As decision-makers in organizations become aware of the advantages TFT flat-panel monitors have over CRT monitors, demand will increase.

Matthew Ki, computer products manager for Samsung Electronics Canada, says demand for flat-panel displays is not great in North America or developing nations—yet. Demand for TFT LCDs in Asia and Europe currently meets or exceeds supply. Why should manufacturers lower prices for a North American market that is not interested, when they are getting good prices for current production capacity? Ki feels that by 2002 manufacturing output should increase. Manufacturers with major market shares in Europe and Asia will attempt to establish themselves as dominant suppliers of TFTs in North America and developing nations. As they compete for shares of the North American market, we can expect manufacturers to begin aggressively reducing prices.

A worldwide glass shortage is the reason David Philp, director of sales and marketing for LG Electronics Canada, offers for the high cost of LCDs. A great deal of glass is required to produce monitors, he says, and the situation is not helped by the high worldwide demand for notebook computers with TFT screens. Much of the production capacity for flat-panel displays already goes into notebooks.

As well, the way active matrix TFT LCDs are made means individual pixels cannot be repaired or replaced, says Philp. So, if a customer returns an LCD under warranty with six or more pixels not functioning, the entire unit must be scrapped. This represents a considerable investment, usually over $1,200. The customer must then be given a new unit—a cost borne by the manufacturer.

In contrast, a CRT monitor returned under warranty can usually be repaired, and quite often without replacing the actual tube. In the unlikely event the entire CRT has to be scrapped, the manufacturer loses only a fraction of the cost of replacing a competitive flat-panel display.

How we tested

The computer system used to test the flat panel displays was a 600 MHz Pentium III with 128 MB RAM, and a Quantum 13.6 GB hard drive. An ATI Rage 128 AGP video card with 32 MB of video RAM was used to drive all the monitors. All of the models were tested at 1,024x768 resolution setting. The refresh rate of the video card was left at the optimal setting, except where mentioned.

Windows 98 Second Edition was the operating system used. Windows 98 found and identified each monitor on boot up. For the tests, all models were first installed as Plug and Play monitors. Where noted, software drivers were added later.

We compared the picture quality as it appeared from our test platform and (perhaps unfairly) the picture when connected to older video cards. We also looked at features, price, specifications, dimensions, and how easy each monitor was to move around. Obviously not all users are interested in paying for a swivel or detachable base, multilingual on-screen display (OSD), or multimedia options.

One thing that became clear during our testing was that when you're in the market for a flat panel display it's important to make sure your video card is up to the job. When we tried some of the evaluation samples on other computers using typical PCI video cards, the results were mixed. Streaking occurred with some units, and other times colours were not as vivid as with the ATI AGP video card. If you're going to invest thousands of dollars in a monitor, a video card upgrade adds only a small amount to the total purchase, but can make for a display that is far superior.

Software from Displaymate Technologies (http://www.displaymate.com) was used to test all the units. The Obstacle Course, part of DisplayMate for Windows version 1.2, is a demanding test of a monitor's ability to handle different signals. With the possible exceptions of graphic artists and video editors, most users would not place such extreme demands on their monitors.

Continued on page 65

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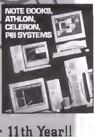

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Keep it flat

Continued from page 63

Apple Studio Display

From Apple Canada
Tel 800 538 9696 http://www.apple.ca
Suggested retail price $1,949

The screen tilts up and down and swivels left and right. The left-right swivel feature is handy when you need to get behind a machine to plug it in. The adjustable base allows the screen to be raised 11 cm (4.3 in.). At 39.4 (15.5 in.) wide, the base is unusually large. If a user does not want, or does not have room for the base it can be removed and replaced with a smaller picture frame stand, which is included. The base and border surrounding the screen are made of translucent white plastic.

OSD controls are on the bottom of the screen, where they can be easily manipulated.

Tilt adjustment is 10 degrees and +45 degrees. Swivel adjustment is ±45 degrees. Viewing angle is ±60 degrees horizontally and ±45 degrees vertically.

A two-port USB hub is built into the Studio Display.

The picture was excellent, possibly because the monitor was designed for the video card that is installed in the test platform (the ATI Rage 128 is standard in all Apple G4 computers though this monitor can certainly be used with Windows based PCs). Flicker was barely noticeable even in the most demanding stages of the test.

Hewlett-Packard Pavilion FX70

From Hewlett-Packard Canada
Tel 800-387-3867 http://www.hp.com
Estimated street price $2,237

This unit is a soft grey color with the control buttons for the OSD tactfully hidden out of the way on the bottom left of the display panel. The FX70 comes with both analogue and digital interfaces, making it ready to go if you switch to a digital graphics card.

As this is a multimedia monitor the base contains speakers from Polk Audio, ported for better bass frequency response. The stereo speaker input jack is on the rear of the base. The stereo audio cable also has a subwoofer connector.

The display will tilt 5 degrees and +35 degrees, so it can be viewed easily by someone standing above it. Viewing angle information was not available from Hewlett-Packard at press time.

Picture quality was generally very good though some flicker was noted in portions of the test when refresh was set to "optimal". Reducing the refresh rate from 85 Hz to 75 Hz decreased the amount of flicker appreciably.

IBM T55A

From IBM Canada
Tel 800-465-7999 http://www.can.ibm.com
Suggested retail price $1,119

The sleek black finish on the model we looked at is certainly different from traditional computer beige. It is also also available in pearl white. The 5 cm (2 in.) bezel surrounding the screen seems large, however.

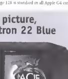
The unique controls on this unit are easy to find and use. They are unobtrusively placed at the front directly under the outside ➤

For the big picture, try LaCie's Electron 22 Blue

Got a couple thousand dollars to blow on a high-quality monitor but don't want to go the flat-panel route? We recently had a chance to look at LaCie's Electron 22 Blue monitor. Designed for graphics professionals, this CRT display provides a huge 51 cm (20 in.) of actual viewing area.

Electron 22 Blue

From LaCie Canada
Tel. 416-530-2545. http://www.lacie.com
Estimated price $1,899



LaCie's Electron 22 Blue CRT monitor with hood attached.

The Electron 22 Blue has a Natural Flat Aperture Grille. LaCie claims the Natural Flat tube eliminates distortion and reduces reflection because the projected image is flat.

The image on a 100 percent flat screen more closely resembles how an image appears on paper.

The monitor stands 50 cm (19.7 in.) tall, 50 cm (19.7 in.) wide, and 48.2 cm (19 in.) deep. The round base has a diameter of 25.5 cm (10 in.), which is a relatively small footprint for such a large monitor. The display can swivel 180 degrees and tilt up or down at any position through swivel.

On-screen display buttons are located on the front panel beneath the screen. On the rear there are two upstream and three downstream USB ports, two video ports, and the power cord jack.

This digital monitor's on-screen display offers users almost too much control over the image. After spending considerable time adjusting the controls we found it was easier just to use auto adjust.

We ran our evaluation unit through DisplayMate Technologies' (http://www.displaymate.com) Video Obstacle Course, part of DisplayMate for Windows Multimedia Edition 2.0. The obstacle course is a demanding test of a monitor's ability to handle different signals. Most users will never subject their monitors to extreme tests like this, but as the Electron 22 Blue was designed with graphics pros in mind, we thought it appropriate.

The Electron 22 Blue performed admirably at different refresh rates and resolutions. Colours were very bright and sharp. The view was particularly brilliant when we cranked the resolution all the way up to 1,600x1,200. Even tiny text was readable. Screen regulation was also impressive at various settings, with virtually no picture wobble.

When a user's eyes are moving off-screen and back, or inspecting the outer edges of an image, the dark blue colour of the exterior makes the transition easier than traditional computer beige of most monitor cases. A three-sided blue hood, which is black inside, can be attached with Velcro to the case to reduce glare from overhead lights and improve brightness. The hood also helps to keep lighting conditions consistent.

The estimated price of the Electron 22 Blue rivals the price of some 15-inch active-matrix flat-panel monitors. In this price range some users might be tempted to purchase a flat panel, for size and radiation reasons. However serious graphics professionals and users who appreciate true colour will prefer the bigger screen and better colour reproduction offered by a CRT monitor. The distortion free flat screen is a bonus.

The Electron 22 Blue comes with a three-year warranty.

—Dave Chappelle

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edge. A light touch on any of the buttons produces the OSD. Settings can be locked or unlocked by holding a button for 10 seconds.

Screen tilt is -4 degrees and +41 degrees. Viewing angle was not available from IBM at press time.

There was noticeable flicker during the full resolution portion of the test. This was true of every unit we examined, though, and should not be a problem under any but the most demanding uses. Otherwise, the picture was high quality and suitable for most applications.

KDS Radius 5-3P

From KDS Canada
Tel 888-537-6001 http://www.kdscanada.ca
Estimated street price $1,502

KDS has produced a monitor with smooth, futuristic styling. This unit looks great and is aggressively priced. Speakers are built into the base, which is removable for mounting on the wall.

OSD controls are hidden, yet easily accessible on the right rear of the panel. One touch of the auto-tune button centered the display.

Viewing angle is typically ±70 degrees horizontally and ±60 degrees vertically. The screen tilts, but exact specifications were not available by press time.

While the colours appeared somewhat faded when we connected this display to a plain PCI video card, they were brilliant on the test bench machine, and the picture quality was very good.

KDS Advance Replacement Express Service warranty offers customers a replacement unit directly from the factory in case of problems.

LG 500LC

From LG Electronics Canada
Tel 888-542-2623 http://www.lge.ca
Suggested retail price $1,499

LG Electronics is a major manufacturer of LCD screens. It is likely that other models we tested contained LG screens.

The base of the 500LC has a cutout for video and power cables to pass through on their way to the interface, which tucks everything away quite nicely.

User controls are small buttons tastefully located beneath the front of the screen, out of the way but still easy to reach and use.

Screen tilt is -5 degrees and +30 degrees. Viewing angle is ±60 degrees horizontally and ±45 degrees vertically.

There was noticeable flicker during the demanding full resolution test and at Windows shutdown, but otherwise picture quality was very good and for the price, this is a good buy.

NEC MultiSync LCD 1525V

From NEC Canada
Tel 800-632-4636 http://www.necteth.com
Estimated street price $1,549

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www.canadacomputes.com

Keep it flat

Continued from page 66

NEC Technologies is another major manufacturer of LCD screens. It is likely that other models we tested contain NEC screens. This particular model uses a special space-saving base, making it an extremely compact unit.

By removing a plastic cover from the rear of the unit, the video and power cables can be plugged in. The cover can then be left off or replaced. While probably not a design consideration, future editions of this arrangement might allow for wall mounting, if the base were also removed. This model had the lowest-sitting mount of the units we tested.

Screen tilt is -5 degrees and +33 degrees. Viewing angle is ±55 degrees horizontally and ±40 degrees vertically

The maximum refresh rate of 60 Hz may be on the low side for some users. The image was very bright with no discernable errors, though a bit of flicker was detected. Adjusting the RGB controls in the OSD made this flicker less apparent Overall, this is a high-quality display for a reasonable price

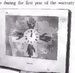
Philips 150B

From: Philips Canada
Tel. 800-479-6696. http://www.pcstuff.philips.com
Estimated street price: $1 699

On this monitor, the OSD controls are on the right side They include a rotary control that seems easier to use than buttons, and the manual contains enough instructions to allow everyone to tune the image to his or her satisfaction

The base allows for tilt and swivel, and is removable for wall mounting with the optional wall mount kit On the rear is a USB bay for plugging in an optional USB hub

Philips offers a 48 hour model-to-model swap during the first year of the warranty



During years two and three repairs are made within five working days.

Screen tilt is -2 degrees and +32 degrees Viewing angle is ±75 degrees horizontally and -50 degrees +55 degrees vertically

When connected to a PCI video card the image colours were faded slightly, but during general use with a newer card picture quality was very good and suitable for most applications.

A more expensive model, the 150P, comes with multimedia features built in

Princeton APP520

From Princeton Graphics
Tel: 800-747-6249 http://www.princetongraphics.com
Suggested retail price: $1 649

Princeton's APP520 uses a space saving design

which is an excellent feature for desktops with extremely limited space

Control buttons on the rear of the right side are easily manipulated. Some minor adjustments were necessary before carrying out the tests

Screen tilt is 5 degrees and +27 degrees. Viewing angle is ±60 degrees horizontally and ±55 degrees vertically

There was pronounced flicker during some of the more extreme tests at the monitor's recommended refresh rate, and at the Windows shutdown screen Lowering the refresh rate to 60 Hz improved this, and adding the software drivers made no discernable difference.

The APP520 comes with a three year warranty that includes 48-hour advanced replacement.

Samsung SyncMaster 570S

From Samsung Canada
Tel 800-726-7864 www.samsungcanada.com
Suggested retail price $1 799

Samsung is another major manufacturer of LCD screens, and it is likely that other models we tested contain Samsung screens

You can put the old phone book away with this model, as this screen can be raised or lowered 5 cm (2 in) The video and power cables interface with the unit directly in front of the base However, this appears to restrict swivel movement slightly

Screen tilt is -5 degrees and +20 degrees.

Continued on page 70

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Keep it flat

Continued from page 68

Viewing angle is ±55 degrees horizontally and +60 degrees vertically

Control buttons on the bottom front of the border are easy to see and use. Holding a button for five seconds locks or unlocks the settings. Picture quality is excellent overall.

Samsung SyncMaster 570P

From Samsung Canada
Tel 800-726-7864 http://www.samsungcanada.com
Suggested retail price: $1,999

The "P" in this model number stands for plus. This multimedia monitor from Samsung also has a base that allows the screen to pivot 90 degrees—an excellent feature for users, such as those doing graphics work or desktop publishing, who prefer to work in portrait mode.

In addition to the necessary video, transformer, and power cables, this unit includes two stereo cables with mini plugs and a stereo mini plug for RCA cable.

On the rear of the multimedia pivot base there are additional jacks for microphone out and sound in. On the side are jacks for microphone in and headphones out. Additional controls include On/Off/Volume, Bass, Treble, and Microphone On/Off.

Screen tilt with the multimedia pivot base is 5 degrees and +20 degrees. Viewing angle is ±55 degrees horizontally and ±60 degrees vertically.

As with the 570S, control buttons on the front bottom of the border are easy to see and use. Holding a button for five seconds locks or unlocks the settings. Although a slight blockiness may appear in portrait mode at certain refresh rates, picture quality is otherwise excellent.

Sceptre ST15B

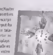
From Sceptre Technologies Inc
Tel 800-788-2878 http://www.sceptre.com
Suggested retail price: $1,649 (from US$1,099)

This is the smallest and lightest unit we tested. The screen is surrounded by a striking 1.3 cm (0.5 inch) silver border and supported on a black base. Sceptre engineers were able to slim this model down to an anorexic 3.8 cm (1.5

The future of flat

SyncMaster 150MP takes multimedia to the next level

A lot of lip service has been paid to "convergence" over the last number of years, but true convergence technologies have always seemed to be just around the corner. We received a pre-production LCD monitor from Samsung that indicates one direction for future convergence appliances.



When it comes to multimedia, the Samsung SyncMaster 150MP goes a step further than many of the other monitors that claim to be multimedia ready. In addition to incorporating stereo audio, the rear of the 150MP features input for composite video, S-Video, and an antenna for off air television. Though it also has a built in tuner, the monitor as a whole isn't much larger than standard flat panel displays.

A remote control comes with the monitor and allows the user to flip between the computer, two different video signals, and picture in picture mode (allowing users to watch TV while working). Standard on screen display controls—like brightness and contrast—can also be accessed from across the room via the remote.

The monitor has a tilting base, but can also be mounted on a wall.

The 150MP isn't available yet, and a few kinks still need to be worked out, but when the device becomes commercially available (hopefully midway through the year) it's expected to retail for $2,499.

—Sean Carruthers

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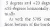

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in.) deep. With the base detached the screen can be flush mounted on a wall to save desk space.

Screen tilt is 10 degrees and +15 degrees. Viewing angle is ±40 degrees horizontally and +10 degrees and 30 degrees vertically.

Control buttons are located on the right rear of the border but are labeled on the front with icons to aid users of any language. One minor quirk however: if save and exit is not pressed after invoking the OSD, it will not disappear from the screen.

The picture was very clear even when connected to an older PCI video card.

Tatung L5CBS
From Tatung Canada
Tel. 800-827-2150 http://www.tatung.ca.com
Suggested retail price: $1,499

The L5CBS was the only monitor in this month's test that did not require the auto button to be pressed to centre the image on screen. We thought it might be luck but we tried it twice. Every other unit required a small amount of horizontal positioning adjustment before all tests could be completed.

Control buttons are positioned front and centre on the bottom of the screen for easy access.

This screen does not tilt downward but tilts +20 degrees. Viewing angle is ±60 degrees horizontally and -55 degrees +45 degrees vertically.

The picture quality was very good, with minimal flicker during the more difficult portions of the test. This represents good quality for the price.

Viewsonic VP151 ViewPanel
From Viewsonic Canada
Tel. 800-888-8583 http://www.viewsonic.ca
Suggested retail price: $2,379

Viewsonic is one of the brand leaders when it comes to monitors and the VP151 is a perfect example of why, as it's loaded with features.

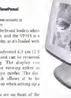
The base can be adjusted 6.3 cm (2.5 inches) for height and can be removed for wall mounting. The display can pivot 90 degrees for viewing either in portrait or landscape modes. The display swivels, which allows it to be pushed out of the way when setting up a system.

The OSD controls are on front of the base. On the right side of the base are three USB ports, two of which are downstream. On the left side are four audio ports and at the rear are USB and video ports.

Screen tilt is 5 degrees and +15 degrees. Viewing angle is ±80 degrees horizontally and ±60 degrees vertically.

At certain refresh rates, the colour gradients were not smooth but most users would not notice and it was easily corrected. Otherwise the picture quality was excellent and useful features like swivel tilt and pivot make this a true multimedia monitor.

(Note: Viewsonic also has more basic 15-inch LCD monitors that are available for more budget oriented consumers.)



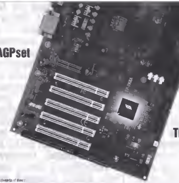
Editor's choices

Apple Studio Display
Despite its Tupperware-like appearance it gets the editor's nod. Overall it had the best picture, even when not connected to its favourite video card. There are thousands of ATI Rage users who would welcome this model.

Sceptre ST15B
The smallest, lightest, and (in my opinion) best-looking unit. The picture quality of this monitor was excellent no matter what we connected it to, and the price is very competitive.

Samsung 570P
The picture quality of the Samsung screens is superb. The 570P offers both tilt and pivot for more viewing flexibility, as well as a good sound component. This is a lot of monitor for the money. ☐

Dave Chappelle works in TCP's Test Lab, and is also a Support Specialist with Tecomp Systems Corp. in Markham, Ont. He can be reached at dave_chappelle@tcp.ca.



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Bring on that light, bright light!

It's show time as more and more businesses discover the value of visual presentations. And if you're in the market for a presentation projector, the offerings are getting lighter, brighter and increasingly affordable.

By Tom Venetis

The mantra smaller, lighter and brighter is driving the strong growth of the projector market in Canada. A recent Evans Research Corp. study showed that, in Canada, this market grew 41 percent in 1999 over the previous year, and will continue to show strong growth well into 2002.

The Toronto based research firm pegs this growth on several factors, including improved image quality and ease of use, and a continued drop in prices. These trends are particularly true for portable projectors—the growing popularity of which can also be attributed to their dropping weight. Many companies are now manufacturing projectors that tip the scales at less than 4.5 kg (10 lb.), and in some instances even less than 2.5 kg (5 lb.)

This has made many of these ultra-portable projectors, as they are often called, a popular item for mobile professionals and sales people. By bringing along their own projector, they no longer have to worry whether their notebook PC will be compatible with the bulkier projectors often found in corporate boardrooms. Instead, they plug their lightweight projector into their notebook and start their presentation.

Compaq's ultra-portable MP1600 projector

"With my job as the notebook product manager, I travel around quite a bit and I do a lot of presentations to various sized audiences," says Peter McNeill, product manager for mobile computing with Compaq Canada Inc., in Richmond Hill, Ont. "When I first started doing it in 1997, we did not have portable projectors—or they were not very portable. So I would go in with my notebook and I'd keep my fingers crossed whenever I approached the projector that was there. I'd have to fiddle around with it and hope I could get it up and running."

Compaq recently entered the growing portable projector market with its MP1600. Using Digital Light Processing (DLP) technology from Texas Instruments, the projector is designed to provide up to 600 lumens with up to 90 percent uniformity in the projected image. The

Continued on page 76

Connecting VCs and startups

You finally worked out how to make a $1 million on the Web. Now, the only problem is accessing the capital to get your idea off the ground.

By Tom Venetis

Conventional wisdom in the "new economy" would say that having a dot com attached to a company name is enough to start the money flowing in from investors and venture capitalists. And certainly that seemed the case only a short while ago. As soon as an Any-name.com company started up or an established brick and mortar firm started an Internet-based venture, those with money to invest stampeded to their doors or bought their stock in record numbers when they went public.

But since technology and dot-com stocks started to take a beating in April, Internet based startups have been finding it harder to get the funding they need to either launch or to move into the next phase of their growth. That's not because there are no longer any investors out there. In fact, there are probably more investors now looking to put their money into Internet based businesses than ever before. The difference is that they are being much more careful in assessing potential investments.

"A lot of people think they can scribble an idea on a napkin, show it to a venture capitalist and they will hand over a million bucks," says Nick Jones, co-founder of the Toronto-based UpstartCanada.com (http://www.upstartcanada.com)

Because investors are much more careful in where they are going to invest, Internet startups need to become more savvy in how they present themselves. They need to begin concentrating on sound business fundamentals, such as how they are going to make money and turn a profit if they hope to get the necessary funds they need, Jones suggests.

Jones ought to know what he is talking about. When he worked with Chapters Online, one of his duties as a business development

Continued on page 88

NetWinder a good thing in a small package

With Microsoft's Pocket PC and other handheld platforms extending the power of the PC to devices weighing a few hundred grams, it takes a lot to amaze these days, but the NetWinder from Rebel.com manages to pull it off.

The NetWinder is a full-featured Linux server that weighs around 1 kg (2.2 lb.) and can serve 100 users. You can think of the NetWinder as a network and Internet appliance, since it is so easy to set up and to work with. A few minutes of configuration were all I needed before I was able to use it on my LAN as an Internet gateway. Some of its other uses, as an email server or firewall, will of necessity take more effort and time, but it is always easy to work with.

Rebel.com used to be the hardware division of Corel before being spun off. While Corel retains a sizeable investment in it, Rebel.com is an independent company that makes its own decisions. An example of this is that NetWinder runs the Red Hat Linux distribution not Corel Linux.

What a server does and how it works are both more important than how it looks, but I confess to being fascinated by the NetWinder's appearance. The NetWinder series consists of rack mount and compact desktop versions. I tested the latter, a model called the OfficeServer, which has 64 MB of RAM and a 10 GB drive. Like the others in the series, it has an external power supply, which helps to partially explain its slim dimensions—of 5x24x15 cm (2x9.5x6 in.)—and its light weight (noted above). It has ports to connect a mouse, keyboard and monitor. It also has a serial port for an external modem, parallel port support for a printer, external CD-ROM or Zip drive, and two Ethernet ports (one 10Base T and the other 10/100Base T).

Although this computer could be used as a Linux workstation, it is really intended to be used as a server, and to be configured and administered over the network via a Web browser—which is how I'm using it in my tests.

The external power supply is a partial explanation for its tiny size. Another reason is the CPU, a 32-bit, 275 MHz StrongARM RISC design, which uses far less power than most Intel or AMD processors. Consequently the NetWinder doesn't need a huge heat sink or fan(s), which means it is happy in a much smaller case. In keeping with the appliance philosophy, the NetWinder has no expansion

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Bring on that light, bright light!

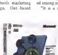
Continued from page 73

MP1600 also offers XGA (1024x768 pixel) resolution and an AutoSync feature to automatically scale the projected presentation to fill the screen whether the information is displayed using VGA (640x480), SVGA (800x600), or SXGA (1280x1024) resolution.

A key feature of many of these new ultra portable projectors is their ability to handle multimedia and interactive information. In order to handle that kind of rich media, the MP1600 comes with an optional video adapter allowing the presenter to switch between computer and video inputs. This eliminates the need to set up a separate video presentation.

Margie Leslie business tools marketing manager with Mississauga, Ont.-based Microsoft Canada, says that as presentation creation software has become easier to use and more powerful, many more business people are adding media-rich elements to their presentations. That is why Microsoft has released a set of business tools for use with its standard Microsoft Office tools, allowing users to create and manipulate graphics, organizational charts, or project timelines for use in PowerPoint presentations. The tools—Visio, Project, PhotoDraw and MapPoint—can be purchased individually.

Compaq is not the only manufacturer looking to incorporate multimedia support into its projectors. Late last year, Toronto-based Epson Canada Ltd. released its own line of portable projectors that can handle a range of multimedia material. The line includes the PowerLite 710, 700 and 500 models.



"You have a set of projectors that can handle all the different resolutions, video and PowerPoint," says Stan Klebanoff national sales manager with Epson. "Our projectors can handle a picture within a picture, so you can have a video running with the PowerPoint presentation running in the background."

The projectors come with built in speakers, but external ones can be attached for better sound. The PowerLite 500 and 700 deliver up to 600 lumens each, while the 710 projects up to 1 000 lumens. The PowerLite 500 offers up to SVGA resolution, and the PowerLite 700 and 710 can deliver native XGA resolution. The most powerful of the trio, the PowerLite 710 weighs just 2 6 kg (5 8 lb.)

A distinguishing feature of Epson's line of projectors is their use of a three LCD projection system. Klebanoff says this system allows for better image quality, colour saturation and brightness compared to DLP based projectors.

"DLP technology works on a single micro-mirror device chip that has mirror pixels that will reflect or not reflect light," Klebanoff says. "But in order to get the red, green and blue needed to make a colour image you have to put a red, green and blue colour wheel in front of it. The problem is that you are only shooting one colour at any one time so 65 to 70 percent of the light is lost. So you have to beef up the power output in order to get a bright projection but the colour saturation goes way down."

With LCD-based projectors, three LCD panels are placed around a glass prism with the light split into red, green and blue individually. The colours are combined in the prism and a full colour image is sent to the screen.

However not everyone agrees that LCD technology is superior to DLP. Walnut, Calif.-based ViewSonic Corp believes both technologies offer benefits to users of portable projectors. The reason LCD has been at the forefront is that the technology has been in the market longer and thereby has become accepted among more users of portable projectors.

"It is a mature product," says Jeff Klass director of sales for advanced products with ViewSonic. "DLP technology was introduced around 1995 so it's about five years old. People often equate age with colour uniformity and clarity of image. But it's really up to the user what is best for them, DLP or LCD."

Klass says ViewSonic has tried to incorporate both technologies into its line of portable projectors in order to give users a choice.

Recently, ViewSonic refreshed its Office Theater line of products by releasing its PJL855 and PJL1035 ultra portable projectors. The PJL855 weighs only 4.5 kg (9 9 lb.) and its LCD projection system can offer up to 900 lumens with 800x600 resolution. The PJL855 features a back-lit wireless remote with image freeze and zoom capabilities as well as a built-in mouse and laser pointer. The PJL1035 is a XGA projector (weighing the same as the PJL855) that is equipped for most PCs, laptops and handheld computers. It offers up to 750 lumens with a 100-1 contrast ratio, and a white point setting similar to a cathode ray tube (CRT) display. Other features include a wireless remote with built in mouse and laser pointer.

ViewSonic PJL855 ultra-portable LCD projector

One company that has decided to focus almost exclusively on the DLP technology for its portable projectors is Wilsonville, Ore.-based InFocus.

Lisa Kayhe, product marketing manager for InFocus, says DLP allows the company to deliver portable projectors that meet the increasing demand for portable projectors that are both lightweight and feature packed.

Mountain View, Calif.-based Pacific Media Associates recently released a study that says the worldwide revenue for the data video pro-

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Jon 'maddog' Hall talks Linux

By Jeff Evans

For the last six years, Jon "maddog" Hall has been one of the strongest and most effective supporters of the Linux open source operating system in North America. With more than 25 years of experience in the computer industry, Hall has a master's degree in computer science, and has held senior technical, software development and marketing jobs at Digital Bell Labs and Compaq

Maddog also has more than 17 years experience with the Unix community, and a personal history that seems to have primed him with the determination to see an open-source operating system done right.

Since meeting Linux pioneer Linus Torvalds in 1994, maddog has become a friend of the Torvalds family and is the godfather to Linus and Tove's two children

Maddog is currently the executive director of Linux International (http://www.li.org/), the non profit body that promotes the development of the Linux operating system. Hall lectures and teaches widely on Linux and is also one of the most prolific and popular authors of Linux related books, including several *For Dummies* titles.

In mid-May, canadacomputes.com editor Jeff Evans had the opportunity to interview maddog, who was in Toronto to attend the Linux Canada conference and exposition.

JE. How did you meet Linus Torvalds and get involved in Linux?

JMH: I had been involved with the Unix operating system for about 17 years, and was quite active in Unix user group activities. I was trying to get some guy over from Europe to talk about this Linux open source operating system for the 1994 meeting of the Digital user group DECUS in New Orleans I persuaded DEC [Digital Equipment Corp] management to fund Linus to visit the U.S. and talk about Linux.

I met Linus, and had my first shot at using Linux. I find that using an operating system for the first time is a bit like playing a piano. After a bit, you can tell if your instrument is a good one. After I tried Linux I thought, "Hey, this is good!"

I discussed the possibility of Linus doing Linux for Alpha-based computers Linus said he was very interested but that he was having trouble getting a developer's unit from DEC, so he was going to develop Linux for the IBM PowerPC instead He was doing everything on his own time, his own old PC at his desk, and he had no money I contacted DEC, and got him an Alpha computer right away So Linux was developed for Alpha not PowerPC.

Continued on page 82

WordPerfect Office for Linux a desktop contender

By Issie Rabinovitch

I finally received Corel WordPerfect Office 2000 for Linux. I had asked for the Deluxe Edition, but ended up with the Standard Edition. This is due to cutbacks at Corel, no doubt. (This is meant as a joke, obviously, but it is a legitimate reference to the financial problems Corel continues to suffer)

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Since I have the Corel Linux OS running on one of my computers, it didn't take me long to install the suite In fact, once I found a knife to cut through the shrinkwrap, opened the package and extracted the CD ROM it took no more than six minutes to do the installation. I've been using the software for a week, during which time I've gone through many of the typical tasks performed with an suite of office applications. I'm continuing to work with WordPerfect Office 2000, which will surely lead to additional insights over time but I already have enough information to write this review

As noted above, WordPerfect Office 2000 for Linux is available in two different editions. Both contain the downloadable version of the Corel Linux OS, as well as WordPerfect 9, Quattro Pro 9, Corel Presentations 9 and CorelCentral 9 The Deluxe Edition offers more clipart images, fonts and photos, as well as some games, Netscape Communicator and Paradox 9, Corel's relational database. For the relatively modest price difference ($50) I would recommend the Deluxe Edition as the better value even if you don't think you need a relational database

The minimum system requirements on the software side are Linux Kernel Release 2.2 or higher and X-Windows. Any recent distribution of Linux should work, although obviously Corel is making it as easy as possible for users to choose its distribution On the hardware side, Corel specifies a minimum of a 166 MHz Pentium with 32 MB of RAM but it recommends a 200 MHz Pentium with 64 MB of RAM. For a typical installation 300 MB of disk space is required. Other requirements include a CD ROM drive, VGA monitor mouse or tablet and an Ethernet card for network connectivity

Many people will be surprised at the high minimum requirements since it is widely believed that nothing more than an old 486-

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Mac News

Apple delays final release of OS X

By Justin Siemens

The Apple World Wide Developer Conference kicked off May 15 in Los Angeles, with chief executive officer Steve Jobs delivering the keynote During the event, it was announced that the schedule for the retail version of Mac OS X (http://www.apple.com/macosx/) has been pushed back six months It was previously announced that OS X would be shipping in final form this summer, possibly at MacWorld in July, and that Apple would begin installing it on all new Macs in January 2001 The new schedule has the full version of OS X coming out in January and being included on all new Macs at the same time. To tide over curious Mac users everywhere, there will be a public beta release of OS X this summer which will be available for free when downloaded from Apple's Web site For those without broadband Internet access it may also be be available on CD-ROM for a small fee. This public beta strategy should allow Apple to work out as many bugs as possible before they begin to install the OS on new Macs next year A price for the final, full version of OS X has not been set.

Though OS X is delayed, Apple will release a free public beta this summer

iMovie free

Since Apple began giving away iMovie (http://www.apple.com/imovie) for free at the end of April, more than 150 000 copies have been downloaded. IMovie is a video editing package, which can best be described as a light version of of Apple's professional product, FinalCut Pro (Final Cut Pro retails for $1,499 and is obviously priced out of the realm of most home users) IMovie allows users to combine clips from multiple sources along with titles sound effects and multiple soundtracks The finished movies can then be saved as QuickTime clips for distribution via the Web or on CD or the videos can be imported back to a camcorder to watch on TV Previously iMovie was available only with the purchase of an iMac DV or iMac DV Special Edition For people looking to get into video editing iMovie is certainly worth a look especially since most other packages cost hundreds of dollars IMovie requires a Mac with a PowerPC processor, and a FireWire port.

Update fixes HotSync-MacOS conflicts

Palm Computing has released version 2 6 1 of the Palm Desktop which works with all Palm

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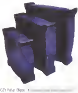
Apple delays final release of OS X

Continued from page 78

Computing handhelds as well as the Palm-compatible Handspring Visor handhelds. This is the first version to be released with support for both lines of computers. Also, the new update fixes a HotSync problem with Mac OS 9.0.4. Since the release of Mac OS 9.0.4 many people have been unable to sync their Palms with their Macs due to changes Apple made to some of the serial USB libraries. The update is available for free from http://www.palm.com.

Apple technician training kit released

Available in the U.S. for about two months, Apple Canada is now offering the AppleCare Technician training kit from the Apple Canada online store ([illegible]). The kit costs $449 and includes a self-paced program that consists of CD-based training materials and diagnostic tools as well as reference documents from Apple's technical library. The course is a light version of what Apple has offered for a significantly higher price to authorized Apple repair shops in the past. Once you have completed the course you'll be well equipped to upgrade and troubleshoot your own Mac. Should you want to go one step further and hire your services out to others, you must pass Apple's service certification exam at an additional cost. The exams are offered by many educational institutions in Canada, and cost approximately $150 (the fee varies from school to school). The training kit is a great idea for someone who wants to learn more about what makes their computer tick, or who is planning a career in trouble-shooting and tech support.



MGE's Pulsar Ellipse [illegible] power-saving features of Ma[illegible]

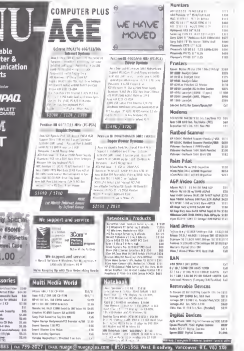
UPS system enhanced for Mac

U.S.-based MGE UPS Systems (http://www.mgeups.com) has released a new line of UPSes (uninterruptible power supplies) that are the first to take advantage of the advanced power-saving features in Mac OS 9.0.4. Called the Pulsar Ellipse, the systems function as normal UPSes but with the addition of a USB port for interfacing with any USB-equipped PowerMac. By using the USB port, the UPS allows the Mac to run as if it were a laptop, so users can tap into the Mac OS power manager to make the most out of the UPS battery. In the event of a power failure, the UPS automatically switches the Mac to battery power and lets users know in minutes how much power they have left. When it's down to the last few minutes, the device saves all the current work and shuts down the computer safely to protect the files. The systems are capable of providing from 10 to 60 minutes of power, and require Mac OS 9.0.4 to function.

New 3Dfx cards coming for Mac

3dfx (http://www.3dfx.com) has announced that the next generation of Voodoo graphics accelerators for Mac are due out this summer and should be shipping in July. With the unfortunate omission of an AGP model, the new cards look set to blow away ATI's Rage 128 Pro, the current king of the hill of graphics cards for the Mac. The two new Mac models are the V4500 PCI and the V5500 PCI. The Voodoo 4 4500 PCI features a single VSA 100 CPU and 32 MB of graphics memory. The Voodoo 5 5500 PCI features dual VSA 100 CPUs, which share a total of 64 MB of high speed graphics RAM. The prices for these cards have not been officially set, but 3dfx has stated that the V4500 is expected to retail for under US$200 and the V5500 for around US$320. Missing from the Mac lineup are the dual CPU V5000 AGP and the quad CPU V6000 AGP. However, unlike the PC version, both Mac 3dfx cards will feature a DVI output for use with digital LCD monitors. Also, for the first time 3dfx will offer Mac drivers with native support for 2D and 3D acceleration as well as OpenGL, QuickDraw, QuickTime, RAVE and Glide acceleration. These cards feature the option of full-screen anti-aliasing, which drastically reduces the jaggies in 3D games. These cards are out to set the standard for 3D performance that will be unmatched—at least until ATI comes out with its new offerings sometime before the end of the year. ❑

Jason Siemens is a Mac tech[illegible] based in Vancouver, B.C. He can be reached at [illegible]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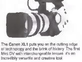

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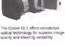

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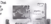

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WordPerfect Office for Linux a contender

Continued from page 78

based computer is needed for Linux. The reality is that a modern graphical user interface on any platform requires significant processing power. I used a system powered by a 200 MHz Pentium Pro and a fast 7,200 rpm SCSI hard disk drive for my tests. That gave performance better than the typical 266 MHz Pentium II-based system, yet I often found myself wanting more power.

The package includes a 400-page printed and bound user guide, a rare touch in this millennium. However you will scarcely need it to perform the installation. After logging in as root (the super or master user account that every Linux system has), you run setup from the CD ROM. As with Windows, there's more than one way to run setup, but the obvious methods work. Trust your instincts, unless you enjoy reading manuals.

You will be presented with the choice of a complete or minimal setup. A minimal setup will install the bare minimum of files required to run the applications. Unless you have very little disk space, choose the complete setup, which installs the suite with the most common settings. No configuration or additional choices are required.

The Corel Application Installer keeps you informed of the progress of the installation via a graphical display which encourages you to register your software and to go to a Corel Web site for additional information. Read quickly, because the entire installation will be over in five minutes on a fast computer. For the more technically inclined, a text window keeps you informed, in real time, of steps like which files are being unpacked, which files are being read, and so on.

The installation procedure doesn't search for previous versions of the applications. I have WordPerfect 8 installed on my system and I expected to be asked whether it should be removed. That didn't happen, although I think it would be a desirable feature. I intend to remove WordPerfect 8 myself in a couple of weeks since WordPerfect 9 supersedes it in every way.

From the standpoint of features, this suite is fully competitive with Microsoft Office and Lotus SmartSuite. It is as compatible as anything on the market, but the compatibility falls short of 100 percent.

WordPerfect 9 reads and writes a huge number of file formats from things like DisplayWrite, MultiMate, Professional Write, Volkswriter, WordStar and Xywrite to Ami Pro (versions 1.2 to 3.0), Word (from versions 4.0 through 5.5 for DOS to versions 1.0 through 2000 for Windows), and WordPerfect (from versions 4.2 for DOS to current versions).

Although Word is just one of several dozen supported formats, for most people it is probably more important than all others combined. I tried opening a wide variety of Word files and the text always came through. However, highly formatted documents don't always display as they should. The same holds true in the opposite direction (opening WordPerfect files in Word).

Compatibility with older WordPerfect formats is essentially complete. WordPerfect 9 uses the same file format as WordPerfect 6.1, 7 and 8, and was trouble free on my hundreds of old WordPerfect 5.1 files.

WordPerfect 9 has what might be termed real-world compatibility. You can send people files in the formats they can handle and they won't even know what you used to produce them. However if you deal with organizations or individuals who use Word 2000, for example, and you often roundtrip documents in which formatting is critical, you may find that nothing short of using the actual application your business partner uses will suffice.

WordPerfect 8 for Linux was written from the ground up as a Linux program, but the applications in this suite were produced using a different methodology, one that works with existing Windows code to produce Linux applications. That must surely be the reason for the less than stellar performance I've observed.

On my 200 MHz Pentium Pro system, I found performance was acceptable in all parts of the suite, with the exception of Quattro Pro 9. Calculation speeds for anything other than very small spreadsheets were unacceptably slow. Quattro Pro 9 for Windows is much faster, as is StarOffice for both Windows and Linux, so I think a solution for this performance problem should be close at hand.

I was able to save files on a diskette, take them to one of my Windows computers and load the files. This worked just as well in the opposite direction. On a local area network (LAN) things are even easier. I was able to retrieve files produced by Windows computers and save files that Windows computers were able to use. Just as no one on the Internet can tell if you're a dog, no one on a LAN knows the OS you're using.

I noticed the first time that I tried to shut down my system that applications aren't X11 aware, which means you have to save your work prior to logging out. This is unlike Windows applications running under Windows, where the OS notices unsaved work when you are logging out and offers to perform the save operation for you.

For now, the bottom line on Corel WordPerfect Office 2000 for Linux is that it works well, despite occasional sluggishness. It is as compatible as any suite on the market and is a bargain. It is even more of a bargain at the street price, which I encourage you to investigate yourself. ❑

Jon 'maddog' Hall talks Linux

Continued from page 78

JE: You became a personal friend of Torvalds?

JMH: We met a few more times, including once in France. In the U.S. I took him to a Red Sox versus Yankees game, which he really liked. His wife Tove seemed to like me, and eventually they made me godfather of their two children.

JE: You seemed to have become a Linux booster in parallel to your day job at DEC. How did you balance the two interests, job and Linux?

JMH: I was working for DEC and talked it [Linux] up at DEC. I was convinced that it was a great low end operating system, very economical compared to the US$2,600 for a Unix licence. Plus it had the source code included [and] didn't need a separate compiler. As hardware got cheaper for high end systems, the cost of Unix OS was approaching, and then exceeding the cost of basic hardware.

When Linus started off, he was trying to create a desktop OS. Then an amazing thing happened: Linux came to be used on servers—a perfect server solution. The existence of the

Continued on page 85

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Bring on that light, bright light!

Continued from page 76

jector category is expected to reach nearly US$5 billion this year which represents a 26 percent increase over 1999

In order to capture a piece of this market InFocus recently launched its LP335 notebook projector This 2.16 kg (4.8 lb) DLP model can deliver up to 1,000 lumens with XGA resolution. It comes equipped with both digital and analogue connectivity options and is HDTV compatible

Kayhe says the HDTV compatibility will become a much sought after feature once users start to incorporate more graphics and media rich content in their presentations, which demands higher quality projection

"Right now we are not seeing many people using things like audio and video on their presentations," Kayhe adds. "But as more people become familiar with the technology, we will see them move to use them and they will want the kinds of features we are now seeing in portable projectors coming onto the market"

InFocus LP335 notebook projector

NEC Technologies Inc also recognizes that portable projectors will have to offer greater support and sharper images if they are to keep up with users demands

In April NEC announced plans to incorporate its proprietary Vortex Technology in its MultiSync VT lightweight projectors. Vortex Technology is designed to help projectors display CRT like image quality for greater depth, detail colour and contrast in the projected images These image enhancing features are particularly important since models in the MultiSync VT line have a variety of video input options.

It is enhancement technology that works with four different subsets of the image, says Bob Guentner product marketing manager with NEC's projection group, which is based in Itasca, Ill "The technology will give you better uniformity of whiteness so we can provide better colour saturation and even better colour display so you don't get different shadings. There is also gamma correction that works with LCD panels and the light source to correct for Red and Blue on the screen and improve image detail enhancement There is also improved colour separation and an expanded grayscale"

Currently Vortex Technology is available in the MultiSync VT440 and the MultiSync VT540 projectors The MultiSync VT440 can project up to 110 lumens and is XGA compatible It accepts NTSC, PAL, SECAM and HDTV video input The MultiSync VT540 can project up to 1 000 lumens and is SXGA compatible ❑

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Jon 'maddog' Hall talks Linux

Continued from page 82

Linux open source community meant that when you needed a new device driver written, you could pick someone [a programmer], and get the driver done without a need for either party to have a source code licence

DEC management couldn't see the forest for the trees though

I helped our engineering group port Linux to Alpha, and began to write articles on Linux The Linux community responded, since I was one of the first few people from the professional computing community who said "This is good People remember things like that.

JE How were you selected to be the executive director of Linux International?

JMH The heads of all the new Linux companies wanted an honest broker not one of themselves, to try to keep what happened to Unix [the fragmentation of the OS into proprietary flavours"] from happing to Linux.

JE. So for the unintiated, why should people take Linux seriously?

JMH What operating system do you use?

JE Windows 98, with MS Outlook MS Office

JMH How often does it crash?

JE Well I'm having some trouble with our email server currently... maybe six or eight times a day

JMH There are documented cases of Linux systems being up and running for three years Linux users are very surprised if the system ever locks or fails. Reliability is the key requirement for any serious computing system whether a server or a desktop Linux is also a true multitasking operating system It's available for a free download and if you're patient you can get free bug fixes. And it offers freedom from Microsoft

For consumers to find Linux en masse, two things have to happen First, the tier one PC makers like Dell Compaq and IBM will offer Linux pre installed as an operating system choice Second, it has to be visible at the store level, which is difficult Stores only have so much shelf space and they order on the basis of volume of systems sold

In 1994, there were about 125,000 Linux users In 1999 about 12 million The estimate for Linux systems in 2000 is 20-25 million

JE. What's the future of Linux?

JMH The particular OS in a lot of ways is irrelevant except that it has to be reliable secure and efficient If Microsoft is broken up into an OS company and an Office [Microsoft's suite of business productivity applications] company to be true to their shareholders, the Office division should develop software for Linux the same way they do for the Mac

There are about 350 million Microsoft Windows PCs in the world and about six billion people Maybe 40 percent of the people alive today may die without making a phone call much less using a PC However, for the rest access to computers and the Internet is going to be important

The Chinese government is moving to Linux, because they believe that it will allow them to develop a domestic software industry, which you can't do if you rely on Microsoft Also, you can run Linux on a refurbed $75 computer surf the Web and do business applications

JE Are you interested in becoming a Linux millionaire?

JMH I've turned down a lot of chances to make a lot of money [from Linux startups]

JE What about all the open source community members who were shut out of the Red Hat IPO (initial public offering) last summer (many who tried to subscribe to the stock issue found out they didn't qualify to buy the stock)?

JMH Well Red Hat made some mistakes But quite frankly the first time any company tries something new breaks new ground there are surprises

For one thing, there are investment laws in countries like Germany and Austria which make it difficult to participate in an American IPO Also, under the "friends and family conditions, you still require some amount of money to invest

I found out later that I was supposedly on two lists of Red Hat Linux community "friends and family" who were supposed to be offered the chance to participate in the IPO I was never contacted I'm not going to go around the rest of my life being mad at someone because they screwed up

I've been good friends with Red Hat since they started I knew them when they were college students and I was working for DEC. I treated them to a good time on the DEC marketing budget. There wasn't any conspiracy it was just one of those "Oh, s— " sort of things.

In five years everyone will know about Linux because of ubiquitous computing handhelds, wireless, Internet everywhere

JE What's in the future for you?

JMH I'd like to set up the maddog School for Microcomputers and Microbreweries, someplace where you can see the sun setting in the ocean It'd be an incubation facility, for ideas, starting businesses and bringing them to fruition. A small number of students and visiting faculty

JE What's your favourite beer?

JMH I'm not too much on dark beer, I prefer light amber, bitter, or light ale

JE. Let me know when you get the school going I'd like to attend, as either instructor or student Thanks maddog

Books by Jon 'maddog' Hall:

Published by CDG Books (http://www.cdgbooks.com)

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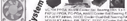

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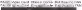

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Connecting VCs and startups

Continued from page 73

manager was to go over all the in-bound business development plans to see which ones might be potential investment opportunities

"As I was looking at all the plans that were coming into Chapters, I realized that many were not very well laid out. They did not know what the issues were or even where to begin describing what it is they wanted to do" Jones adds

In response to this, Jones decided that what was needed was a kind of boot camp where Internet startups could get the skills they needed to successfully approach a venture capitalist or investor In mid-May Jones hosted just such an event a two day camp with a variety of seminars on how someone looking to start an Internet business should go about getting the necessary funding

One of the things attendees discovered is that having a business plan is no longer enough to open an investor s wallet

"The business plan describes the company, what they do what the market is and how they will reach it" Jones says But a big part of it as well is how to go about getting financing You can t just pitch to anyone who will listen You have to look at what kind of money you need and then look at who might be able to provide that funding Some venture capitalists only do bio tech companies and $100 million deals So if you show up with your $1 million online play they won't even look at it.'

Because investors are much more careful in where they are going to invest, Internet startups need to become more savvy in how they present themselves.

Making sure ventures meet the right investors is the goal of Toronto based The Banyan Effect (http://www.thebanyaneffect.com)

Paul Charbonneau a partner with The Banyan Effect says his firm acts as a screen for both the company and investor, filtering out companies and investors that are not suited for each other

"A venture capital company may only want to deal with a company that has been in business for two years, has shown sustained income and has been willing to invest their own money in the business he adds "Others may only want to invest a maximum of $3 million while another may want to invest $15 million but only after the company they are interested in has received its first round of financing"

Todd Smith, a partner with The Banyan Effect adds that while capital is important often a more pressing problem is getting the right technical people and executives on board to help a company continue its growth The Internet is littered with stories of Internet startups that have good ideas but can t get the people they need to pull it off or don't have the right executive mix to get the company out of the garage and out onto financial Main Street

"The biggest challenge is the shortage of talent," Smith adds "Not just the skills perspective, but also the right talent from the point of view of the culture of the company It is not always easy to get the right people who can fit with a company's culture.

Venture players

In an effort to overcome some of the money and talent issues, some venture capital companies have launched their own Internet startups These firms often have a large stake in the companies they start only spinning them off into independent entities when they have achieved their business legs

Toronto based Exclamation Inc. (http://www.exclamation.com) acts as an Internet incubator, focusing on developing companies in house Companies it has created include bigtree.com points.com and ThinOffice.com. Bigtree.com, an office supply company, allows small and mid sized businesses to search and buy supplies online at volume discount prices.

"We have a pool of capital and a group of strategic partners that help us start each business, says Christopher Barnard, president of Exclamation Inc. We then go out and look for professional management for the ideas that we come up with and then arm [the nascent company] with the infrastructure, support and an Exclamation employee who will help them build the company up as fast as possible before helping them find outside financing and resources"

Exclamation starts three or four such companies each year

Toronto-based Bright Spark Inc. (http://www.bspark.com) is a combination of a venture capital fund and incubator which works with companies that are at the earliest stages of development. The company looks to invest and help grow companies that work in the software and Internet sectors of the economy Many times, these companies are simply just a good idea or an early version of a possible product.

"Typically it is a group of two to four people and we help them take an idea and make that idea into a business," says Rick Nathan founder and managing partner with Bright Spark. "We will give them a bit of seed capital and move them into our office In the course of four to six months, we look at potential alliances, figure out a marketing plan get a Web site up, if they are Web based and at the same time, we will recruit for them the right management and technological team."

Nathan sees this approach as helping overcome many of the problems startups have particularly in putting together a solid business plan and getting the right team in place

Already, Bright Spark has some five companies on the go with one that was scheduled to make its public debut in mid May ❑

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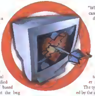
Love bug a wake-up call for cyber-terrorism foes

When the I Love You computer virus hit computers around the world in May, it caught the attention of more than the corporate IS teams who were left scurrying to fix the damage—it opened the eyes of national security and terrorism experts.

By Tom Venetis



To security experts the love bug was a disturbing glimpse of the damage computer savvy terrorists and extremists could inflict on the computing systems we depend on daily.

The love bug is estimated to have caused millions of dollars in damage to corporate email networks. In some cases, the virus forced companies to take systems off line as they struggled to bring the attack under control. In the U.S., it is reported that some 14 federal agencies were affected with some classified systems being harmed. Santa Clara, Calif based Network Associates Inc. estimates that the bug affected 80 percent of computers in Germany and 70 per cent of computers in the U.K.

"When you have an event like that you can't help but ask yourself What if a dedicated group of extremists bent on pursuing their cause targeted some very large companies that are dependent on the Internet?" says Jim Comeau, head of the economic and information security unit at Canadian Security Intelligence Service (CSIS) in Ottawa. "What if somebody for political reasons, decides to put out viruses that are targeted at specific types of computer systems or types of information? The types of attacks we see are only limited by the imagination."

Cyber terrorism, as it is sometimes called, has been of growing concern for national security departments in both the U.S. and Canada. Last year a special Senate Committee on Security and Intelligence heard from CSIS officials that as Canadian society becomes increasingly dependent on the Internet and computers, the threat to critical systems being attacked electronically by terrorist groups, organized crime, politically motivated extremists or even foreign intelligence agencies becomes an increasing possibility.

Entry-level skill required

What worries intelligence experts most about cyber terrorism is that it does not require a great deal of programming sophistication to carry it out. The Senate committee was told that, "a perpetrator of an information operations attack could be any one with a computer, a modem connected to a telephone line and a motive to cause harm."

In April, John Gannon, chairman of the U.S. National Intelligence Council told the Columbus Council on World Affairs that cyber attacks against sensitive systems are becoming

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Free calls... or busy signal?

Tired of paying hefty charges for long-distance calls? Actiontec thinks its new InternetPhoneWizard can help.

By Sean Carruthers

Actiontec USB InternetPhoneWizard
From Actiontec Electronics Inc.
Tel 408-752 7700
http://www.actiontec.com
Estimated retail price $150

Free long distance telephone service through the Internet has been an intriguing promise for years—one that Actiontec's latest solution comes close to delivering. But the Net itself with its multi hopping style of delivering data, undermines the potential of this product.

The hardware portion of the InternetPhoneWizard is a modem-sized device that plugs into the USB port of a Windows 95/98 machine. It has a jack for attaching a telephone handset, and an analogue pass-through to either a modem or a phone jack. The device allows PC to-PC or PC to-landline telephone calls, although to take full advantage of the device, users need two phone lines, or a phone line and high-speed Net access (ADSL or cable). It's worth noting that, even though InternetPhoneWizard looks like an external modem, it does not double as one so you will still need a separate way to connect to the Net.

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Free calls... or busy signal?

Continued from page 89

With two lines, the InternetPhoneWizard allows users to be online, making an Internet phone call, while still able to take analogue calls by hitting the # key twice—a procedure similar to that used in call waiting. Actiontec calls this feature I Phone Switch technology and has applied to patent it.

The service layer that makes Internet telephony possible is handled by what is known as an Internet telephony service provider (ITSP), of which there are several operating in North America. The InternetPhoneWizard uses deltathree.com as the default ITSP, but you can use another provider if you have an account. It's also worth noting that deltathree.com cannot be used from behind a firewall, though other ITSPs can be configured for such use.

The process of making an Internet phone call is simple enough with your telephone connected to the device, you dial the number either using the phone dial pad or the onscreen display. Once the call is established, the box encodes your voice as you talk, and sends it to the ITSP's server. That server passes the data over the Internet to another server near the receiving end which decodes the signal to analogue and makes a connection to the existing telephone service at the far end. The person receiving the call does not have to be on the Internet, since the ITSP switches the call to the existing landline phone service.

With the deltathree.com service, Internet phone calls within North America are absolutely free to those who purchase the product. Charges start accruing, however, when calling outside of North America. Germany, for example, is eight cents a minute (in US currency). Chad is an expensive $1.27 a minute. For Immarsat calls, it shoots up to $7.50 per minute. Most of Western Europe is 10 cents a minute or less and rates are slightly higher in Eastern Europe and in Asia. A list of rates can be seen at http://www.deltathree.com.

On the other hand, users who travel outside of North America and have Internet access can call North America for free (minus any local connection charges), because the software only cares about the destination of the call, not the origin. Therefore if you're in Germany and calling back to Canada, there would be no charge.

Slightly ahead of the bandwidth

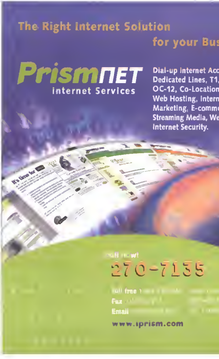
Though long-distance Internet telephony looks good on paper, the actual experience is less than perfect. The main problem is with delays caused by routing the digital data through the Internet. Because your signal doesn't travel directly from point A to point B—it may be routed via Chicago, Boulder and Boca Raton (depending on how the backbone is routing)—it can take a while for the packets to reassemble on the receiving end. This manifests itself in a delay, much like international overseas phone calls from the old days, when signals had to bounce off a few satellites, going thousands of kilometres out of their way, in addition to having travelled the thousands of kilometres of wires and circuitry.

Even local or short distance Internet telephony calls are affected by this delay. If you were in Vancouver and wanted to place a phone call to Victoria, you'd suffer a one- or two second delay throughout the conversation, depending on the volume of network traffic at the time you call.

If you're contemplating purchasing an Internet telephony device, the real consideration is your ability to deal with that delay, which can be quite an obstacle in holding a coherent conversation. If you're like me, you'll probably find it easier to just pay the long distance charges.

Unfortunately, international calls over the Internet are even worse. During testing, we tried calls to a few places overseas and the delay was so severe that our parties always hung up before realizing there was actually someone on the line. With the currently minimal delays on standard international long distance calls, the cost becomes the major factor. Are excessive delays really worth the savings?

It's important to note that these problems are a product of the hardware itself. The InternetPhoneWizard is an interesting and well-thought out device. In many ways, it's simply a product ahead of its time, waiting for the day when there's enough bandwidth to easily handle phone calls on top of everything else. Admittedly it's a fun toy in the interim, as long as the person at the other end of the call is willing to put up with the inevitable timing problems. ❑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NetWinder a good thing in a small package

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slots. In fact, the case isn't meant to be opened, nor does it need to be.

The first step in working with the NetWinder is connecting the 10/100 Ethernet port to a hub or switch. Next, the power cord is connected to the back of the NetWinder and plugged into an electrical outlet. It has no on/off switch. As the computer begins to boot up, you can set the volume control to a midway position so you can hear the synthesized voice say "Welcome to NetWinder." That's the signal that you can begin your work. In the ordinary course of events you won't ever need to power down.

I took the included QuickStart CD ROM to a computer (any computer will do) on my network, and went through the first phase of the configuration. The NetWinder scans the network and suggests an IP address for itself. It also forces you to go through several pages of information. The only way to get to the next stage of the configuration is to page through the documentation. This is done to minimize the chance of impatient users making a mistake.

Once the initial, simple configuration is done, you enter the NetWinder's IP address (typically a non routable address like 192.168.0.1) in your browser and log into the menu with the default administrator account.

There are numerous easy to use menus in Administration Mode. The top-level choices are Users, Groups, Hosts, System, Services, Network, Options, and Help. To configure the NetWinder for the Internet, begin in Network. The OfficeServer supports the following methods of connecting to the Internet: xDSL modem, cable modem, ISDN router, ISDN Terminal Adapter, and dial-up or permanent modem connection. I decided to use my cable modem.

I connected my modem to the 10Base-T port on the NetWinder, then turned on the modem. In the Network menu Ethernet settings of the QuickStart utility, I chose Change These Parameters and entered some of the values supplied by my Internet service provider (ISP). Although the cable companies use DHCP, they always assign the same IP address. I entered that IP address and netmask for the 10Base-T settings. I kept the 10/100Base-T settings as they were, and in the Network Settings area, I entered the values I had been assigned by my ISP for client ID, domain name, DNS servers, and Gateway. I saved these values to activate the changes. Users of Sympatico HSE (High Speed Edition) who occasionally run into compatibility issues since that service switched over to PPP over Ethernet (PPPoE), should note that NetWinder supports PPPoE.

The documentation recommends that NetWinder be used as a DHCP (dynamic host configuration protocol) server. If you choose that option, NetWinder will automatically assign IP addresses to computers on your network. If, like me, you prefer to assign addresses manually, you can easily turn off the DHCP service.

For a workstation on your network to connect to OfficeServer, it needs a valid IP address and netmask, and the address of the NetWinder computer. If you choose to do this manually, you will go to Network in Control Panel. After entering the IP address and netmask, you will enter the IP address of the NetWinder device in the Gateway and DNS Configuration tabs. After rebooting the computer, you will finish your configuration work in your Web browser. In Microsoft Internet Explorer, you will go to the Internet Options of the Tools menu, and choose automatically detect settings in the LAN Settings menu. In Netscape, choose Edit, Preferences, Advanced, Proxies, Direct connection to the Internet. That's all you need to do to take care of Web browsing.

The NetWinder is capable of much more, including file and printer sharing, email services, Web site hosting, remote access, and firewall security. The required software is already installed. Although there are easy to use menus to configure everything, anything involving security on a device that's connected to the Internet needs to be treated with considerable care and respect.

If you already have a good computer with two Ethernet cards, you can achieve many of the same results with a product like the e-smith server & gateway, reviewed in the April issue of TCP. However, for an integrated hardware and software solution with excellent support and appliance-like convenience, the NetWinder I tried is a very good value at $2,395. Other configurations are available, as is much more information, at http://www.rebel.com. ❑

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Put yourself in command

By Helen Bradley

Excel is great for managing all sorts of data—and chances are you have lots of worksheets that you use regularly. In this column I'll show you how to create a fun and useful command centre for Excel that puts your most frequently used files at your fingertips every time you open Excel.

If you follow these steps, you'll end up with a worksheet that opens whenever you start Excel and contains text and image links to all your worksheets. All you need do is to point and click to open the file you want. The command centre will stay open, allowing you to select it anytime to open any other file that is linked to it. One word of warning though: this will be so useful that everyone at work will be asking you about it, so be prepared to show them how to create their own.

Your Excel command centre is a standard Excel worksheet that behaves like a Web page. You add images and text to the worksheet, then link them to the workbooks and files you use most often or that you need to access quickly. You'll see how you can set this file to open whenever you open Excel so you'll always have your files on the screen and accessible with one click. Another bonus is that all the files you use, whether they be Excel, Word or even Access documents can be linked, and thus opened via this single command centre.

The instructions that follow show you how to create your command centre in Excel 97/2000. As well, I've included instructions for creating the same type of command centre in Lotus 1 2 3.

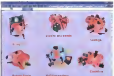
Creating the Excel workbook

Begin by creating a new workbook (click the New button on the toolbar) and removing all but one of the sheets from it. To do this click the sheet tab of the first sheet to remove, then hold the Shift key as you click the last sheet. With all the sheets selected, choose Edit Delete Sheet, then OK.

You'll get a better presentation if you turn off the gridlines and scrollbars for this sheet, so you limit the area of the work book you'll be using to what's visible on the screen. This way you won't have to scroll around the screen to find things. To do this, choose Tools, Options, the pick the View tab and deselect the following checkboxes: Gridlines, Row & Column headers, Horizontal Scroll Bar, Vertical Scroll Bar and Sheet Tabs. Click OK to confirm these settings.

To make the screen look attractive, add a background image or colour to the worksheet. To add a background image, choose Format, Sheet, then Background and choose an image—it will automatically be tiled if it isn't big enough to fill the worksheet area. You can also set a background colour for the worksheet by first selecting the entire sheet (press Control + A), then use the Fill Color button on the Formatting toolbar to fill the cells, or choose Format Cells, Patterns and choose a colour.

For each file you want to open you'll have an image as well as a text link. So you'll need images that relate to the topics of the worksheets. You can use images from a clip art collection or check out what's available at Microsoft's Clip Gallery Live (http://cgl.microsoft.com/clipgallerylive/). From this site, you can search for images and download them into your clip art collection. It's new Search By Style feature groups clip art by the drawing style, which allows you to find images that will look good together.



Create this Excel workbook so frequently used files can be opened quickly and easily

To add an image to your worksheet—from your clip art col-

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Linux for Newbies: Part 12

Home networking: Part 1

By Gene Wilburn

This beginners series, based on Red Hat Linux 6.x, has alternated between system setup information and the basic Linux knowledge needed to make your use of Linux more enjoyable and interesting. We've gone through setup and connecting to the Internet, and we've looked at essential Linux utilities, basic system administration, and fundamental security issues.

As we close out the first year of the column we'll begin to move on to more intermediate and advanced topics. The next three installments (starting with this one) will focus on home networking. This month we'll cover the basics. Next month we'll focus on Samba (creating a Linux server that can be seen in Windows Network Neighbourhood) and in the following month, we'll look at connecting your entire home network to the Internet using IP Masquerading and firewall rules.

It's common these days to have two or more computers per household, especially in homes that have kids using computers for homework and for Internet communications. When you purchase a new PC, you may have kept the old one around. You may have a mixed PC/Mac environment and you might even have a portable you bring home from the office.

Whenever you have more than one PC in the home environment it makes sense to think in terms of networking them together to share resources such as printers and disk space, and to be able to move files easily from one system to another.

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Home networking: Part 1

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Linux can easily participate in a home network, and, in fact, it can become the central server for the entire home. With Samba, Linux can look like an NT server to Windows PCs. With Netatalk, it can participate in a Macintosh environment. And, of course, it can do both at the same time. You can also do this with an expensive NT server, but Linux generally has better performance and the cost is right. All the software you need either comes on your Linux CD-ROM, or is available for download, for free.

Networking hardware

The basic hardware you need for a home network is a hub, some network interface cards (NICs), and some twisted pair Ethernet cables. You need one NIC for each workstation (and possibly two NICs for your server, as we'll see in the third installment of this home-networking series). Many new Windows and Mac PCs come with a NIC installed. A couple of years ago, 10Base-T (10 Mbps) NICs and hubs were standard. Today the industry is moving towards broad acceptance of 100Base-T (100 Mbps). Most current cards are 10/100 and can work on both types of networks.

For a home network, you are unlikely to need anything faster than 10Base-T, but if you're purchasing a new NIC, you might as well get 10/100 to allow you to move to a faster network in the future.

NICs, for Intel PCs, come in a variety of types and generations. Older PCs require ISA NICs, while new ones generally use PCI NICs. If you have acquired an older server it might even be EISA based, requiring an EISA NIC. Most portables use PC Card (PCMCIA) network adapters.

Before purchasing a NIC, you should check the hardware compatibility guide at http://www.redhat.com/support. Linux supports a broad range of NICs, but some are better supported than others. If you choose a well-supported brand and model, it makes integration easier.

I've used a variety of NICs in Linux boxes and have had good luck with most of them. Intel EtherExpress Pro NICs are a good match for busy servers, but for home machines cards such as those made by D-Link or SMC (such as the EZ series) work well and are reasonably priced.

For a home network you can use one of the little 10 Mbit minihubs you find in computer stores for under $50. Minihubs tend to come in five- or eight-port models.

Unless you want to invest in good crimping tools, purchase pre-made lengths of twisted-pair Ethernet cables with RJ45 connectors already attached. They come in a variety of pre-made lengths, but you should always get them a little longer than the distance from your PC or Mac to the hub so you have some slack for putting the cable behind furniture or changing the location of your workstations.

The hub is the centre of your home network. If you have a couple of workstations in the same room, all you need to do is connect each workstation's NIC to the hub and you'll have the hardware part done (assuming you've eliminated any IRQ conflicts, etc., with the NICs).

If you want to connect computers in different rooms in your home, you will have to investigate drawing cable through your house, or consider wireless solutions—which are tidy but somewhat expensive and generally slower than cable.

TCP/IP network addressing

When you have installed the hardware bits and connected the wires, you're ready to begin adjusting your operating system software. The first thing you need to do is lay out the organization of your home network.

Almost all networking today is TCP/IP based and probably everyone has seen a typical IP address, such as 192.168.45.33. With IP certain ranges of addresses define a "network" and every node on the network has a unique number (IP address).

There are connectivity rules and methods that allow individual networks to be connected to other individual networks, allowing a user on one network to communicate with a user on another network. Multiply these connection points by thousands upon thousands and you've got an extremely large shared network called the Internet.

When IP addressing was first invented, it seemed there were so many numbers allocated initially that they would never run out. Then came the explosion of Internet usage and now official IP numbers, reserved for registered domains, are in short supply.

That, however, is a problem for businesses and ISPs, not for homes. Fortunately, the standards bodies also reserved a few series of "private" IP numbers that were designated as numbers that would never be used in public. There are three classes of these private num-

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Creative Cambridge PCWork 4point Speaker w/Subwoofer/FPS 2000 Digital	$98/148
Creative House Theatre 5.1	$345
Altec Lansing ACS33 w/subwoofer	$56
Altec Lansing ACS48 2 w/subwoofer	$78
Altec Lansing ACS54 4 point w/subwoofer	$88
Altec Lansing ACS48 w/subwoofer	$170

Netpro Power System
Asus Pentium III Mainboard
Pentium III 600Mhz
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16 Bit Sound Card
32 AGPMB Video Card
20GB Ultra DMA HDD
1.44 MB Floppy Drive
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17" SVGA 27mm Monitor
48X CDROM
Win 98 Keyboard / 2 Button Soft Mouse
120w Multimedia Speaker
56K V.90 Fax/Modem
$1049

AMD NetStarter 500K6II
K6 II 3D 500MHz
Socket Super 7 100MHz M Board
6.4MB UDMA Hard Drive
32 MB 100MHz SDRAM
3D 8MB AGP Video Card/OB
1.44MB Floppy Drive
17" ATX Tower Case
48X CD ROM
3D Sound/OB
120w Speakers
Win 98 Keyboard 2 Button Soft Mouse
K6-II 533 $529
K6-II 550 $549
$499

Upgrade Special
Intel Pentium System
Gigabyte Motherboard
32 pc 100 ram
Celeron 466 $299
Celeron 500 $325/345
+43 8mb video card + 16 sound card
AMD K6 II System
Gigabyte 7 Socket Motherboard
32 pc 100 ram
AMD K6 II (3D) 500/533/550 $239/Call/275

Networking - Modem

56K modem v90	$24
Acpen ISA 56k v90 INT	$63
USR 56K v90	$95
RJ 45 Cables 10/25/50	$4/9/14
D-link 530 TX PCI 10/100	$21
PCI 10 Base T	$18
10/100 Base T	$20
5/8 Port Hub 10 Base T	$35/49

Accessories

Mouse ps2/AT	$09	Win 98 Keyboard ps2/A	$08
Wheel Mouse	$14	Stereo Speaker	$8

Networking products also available
Corporate clients welcome
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All systems come with one month free internet software

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All prices and products availability subject to change without notice. Prices reflect 3% cash discount. Not responsible for typographical errors. Brand name trade marks belong to their respective companies.

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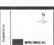

[illegible]
Surcharge for credit cards
Customers pay shipping (Sales or Repair)

Warranty:
System: 2 years labour 1 year parts
(Extended warranty available)
Parts: Common Electronic items
Same or next business day: 100% refund / replace; after next business day to 10th calendar day: 85% refund / replace

Retail Store; Wholesale Price; Please check web site for curent price and items

Special rate for labour or upgrade

WorldTech AMD K6-II 500
- ATX 17" Case
- Aopen 40X CD-ROM
- AMD K6-II 500 CPU(600-550 +$50)
- CPU Cooling fan
- 1.44 MB Floppy Drive
- 6.4GB IDE Hard Drive(8.4GB +$15)
- 32MB SDRAM PC100(64MB +$40)
- 56K Int/Voice/fax/V90/Modem
- Gigabyte GA 5SMM / Matsonic
- with built-in Sound/Video

$495 or $CALL

WorldTech Celeron500
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- Intel Celeron 500 CPU (533 +$15)
- CPU Cooling fan
- 1.44 MB Floppy Drive
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- Elite PII Motherboard
- w/Sound & Video
- w/Network

$599 or $CALL

WorldTech PIII 550E
- ATX 19" Case
- 50X CD-ROM
- Intel PIII 550E CPU (600E +$70)
- CPU Cooling fan
- 1.44 MB Floppy Drive
- 10.2GB IDE Hard Drive(13.3GB +$20)
- 128MB SDRAM PC100
- 56K Int/Voice/fax/V90/Modem
- Gigabyte 6VX7 (6VX7-4X +$30)
- Creative Ensoniq Sound Card
- ATI Xpert@98 8MB AGP Video

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WorldTech Athlon K7 700
- ATX 1[illegible] Case
- 50X CD-ROM
- AMD K7 700 CPU (750 + $100)
- CPU Cooling fan
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- 13.3GB IDE Hard Drive(17.4GB + $20)
- 128MB SDRAM PC100
- 56K Int/Voice/fax/V90/Modem
- Gigabyte 7VM (Asus K7M +$30)
- Built-in Sound
- ATI Xpert@128 16MB AGP Video

$1098 or $CALL

WorldTech PIII 600EB
- ATX 1[illegible] Case
- 50X CD-ROM
- Intel PIII 600EB CPU (677 +$80)
- CPU Cooling fan
- 1.44 MB Floppy Drive
- 17.4GB IDE Hard Drive(20.4GB + $30)
- 128 MB SDRAM PC133
- 56K Int/Voice/fax/V90/Modem
- [illegible]
- SB Live Value PCI Sound Card
- ATI Xpert@2000 32MB AGP Video

$1165 or $CALL

WorldTech Complete System (Special+full feature)
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- AMD K6-II 500 CPU
- CPU Cooling fan
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- 6.4GB IDE HardDrive
- 64 MB SDRAM PC100
- 56K Int/Voice/fax/V90/Modem
- Elite/Aopen/Gigabyte Motherboard
- with built in sound/video
- win98 keyboard
- 140W Speaker
- Generic Mouse
- Acana 15" monitor
- Canon 1000SE Printer

$812*

*After $20 Printer rebate

Bundle A. $28
(purchased with any system)
40W Speaker
Win98 Keyboard
Generic Mouse W/Pad
Microphone W/Stand

Bundle B. $60
(purchased with any system)
320W Speaker
Fujitsu 8725 Keyboard
MS Tracker Mouse 2b W/Pad
Microphone W/Stand

Bundle C. $108
(purchased with any system)
320W Speaker
Fujitsu 4725 Keyboard
Logitech 1st Mouse w/wheel W/Pad
Microphone W/Stand

Bundle D. $125
(purchase with any system)
3D 108 400W Speaker w/Subwoofer
MS Internet Keyboard
M.S. Intelli-Mouse w/wheel W/Pad
Microphone W/Stand w/joystick

Bundle E. $148
(purchased with any system)
GNT 7000A Speaker w/Subwoofer
M.S. Natural Keyboard
M.S. Intelli-Mouse w/wheel W/Pad
Microphone W/Stand w/joystick

Download/view our price list
(1)Common Items +systems (2)Complete Items
Product introduction in Chinese www.pconline.com.cn

Backup Drive

IOMEGA ZIP DH EXT Para/USB	$call
IOMEGA ZIP DR EXT Scsi	$call
IOMEGA/PANASONIC ZIP DR INT IDE	$103/$75
IOMEGA ZIP DR PLUS ext/int. 250MB	$call
LS 120 Internal IDE	$112
1.44MB Floppy Drive	$19

Tower Case

ATX 17" 250W / ST3/787	$40/$41/$41
ATX 16" [illegible]	[illegible]
ATX 24" 250W/300W	$75/$80
ATX 18" 300W blue/white	$45/$48

CD ROM

Acer 40x /Aopen 40x	$65/$65
Vintech 50X	$60
Asus 50x/Wavy 50x	$65/$60
Creative 52x	$81
Panasonic 40x	$67

CDWriter

Creative 8432	$306
HP8250i/HP9310i IDE	$275/$380
Sony 8/4/32	$308
Yamaha 8424 int IDE / SCSI	$405/$423
Panasonic 8432	$275

DVD ROM(bare)

LG 8X/Creative Labs 10X	$call
Panasonic 8x / Hitachi 8x	$160
PIONEER 6x SCSI/10x IDE	$call
Toshiba 8x / NEC 8x	$call

SCSI Controller Card

Adaptec 1505	$call
Adaptec 2940U/2940UW	$call
Adaptec U2W	$call
Adaptec 2944 uw Differential	$call
Asus sc-200/875	$call
Diamond Fire Port 40	$call
Diamond Hometree Card	$call

CPU Processor

AMD K6 II 500/550	$94/$125
AMD K7 600/650 (Box)	$call/$300
AMD K7 700/750/800 (Box)	$307/$406/$524
Intel P 233 MMX	$80
Intel Celeron 400/500/533	$143/$152/$162
Intel Celeron 566	$205
Intel PIII 500/500E	$288/$312
Intel PIII 550E/550 w/Fan	$call/$310
Intel PIII 600E/650/700 w/Fan	$380/$388/$487
Intel PIII 750/800	$596/[illegible]
Intel PIII 850	[illegible]

Hard Drive

Fujitsu 6.4GB IDE (discontinue soon)	$122
Fujitsu 10.8GB IDE	$138
Fujitsu 13.6GB/17.2GB IDE	$164/$180
Maxtor 10.2GB/15GB	$152/$183
Maxtor 13GB/13GB 7200RPM	$170/$186
Maxtor 17.2GB/20GB 7200RPM	$206/$252
Maxtor 27GB/27GB 7200RPM	$330/$327
Maxtor 30GB/40GB	$316/$380
IBM 20.4GB 7200RPM	$205
For SCSI Hard Drive Please Call	$Call
Quantum 3.2GB / WD 1.6GB	[illegible]

Keyboard

Fujitsu 4725	$8
Fujitsu 8725	$15
MS Natural Elite	$32
Generic WIN 98 Keyboard	$11
MS Internet Keyboard	$30
LITE-ON INTERNET	$20
Logitech Cordless Mouse (Wh 8 Mouse)	$call
Turbo Media Enhanced Win98 Keyboard	$20
MS USB Keyboard	$call

Memory

16MB 72Pin Regular	$6
16MB 72Pin EDO	$8
32MB 72Pin Regular	$108
32MB 72Pin EDO	$110
32MB SD DIMM (PC 100)	$call
64MB SD DIMM (PC 100)	$call
128MB SD DIMM (PC 100)	$call
256MB SD DIMM (PC 100)	$call

Modem

USR 56K Int/Vo/isa/DOS/PCI/V90	$77/$52
Aopen 56K Int/Vo/ISA/V90	$67
Aopen 56K Int/Vo/PCI/V90	$36
Motorola 56k V90	$28

Monitor

Acana 15	$170
Acana 17"/Acana 19"	$290/$470
Acer 15" 81E/77c (1 yr labour)	$258/$348
Acer 17" 77e/78E	$340/$423
ADI 15" 4P	$280
ADI 17" GT 5G	$385
AOC 17" [illegible]	$245
AOC 19"	$384
Daytek 17" 1729D	[illegible]
Sony 17" 210G	$call
NEC 17" A700	$call
NEC 17" E700/E750	$call
Preview 15	$138
Preview 17" .25mm	$292
Preview 19"	$570
Samsung 17" 753DF .20mm	$348
LCD 15 flat monitor	$call
Mag /ViewSonic/Optiquest	$check
Vision /Arima/Samsung/Twn	$check

Motherboard

Abit BE6-II/BF6/BM6	$189/$167/$163
Abit BP6 (DUAL CPU SLOT)	$215
Asus K7M	$222
Asus P3B-F/P3B-F1 (PIII PC 100)	$188
Asus P3C-2000	$236
Asus P3V-4X / P3V	$180/$130
Asus P2-99	$141
Asus P5A (AMD K6 II PC 100)	$138
Asus P5A-A (w/Audio)	$138
Gigabyte 5AX/5AA (AMD K6 II PC 100)	$115/$112
Gigabyte 7IXE+/6VX7+ (PIII PC100)	$115/$118
Gigabyte 6VX7-4X	$145
Gigabyte 6X2MV+/ZX7LA7	$170/$134/$125
Gigabyte 5SMM V+S	$113
Gigabyte 7IXE	$179
Matsonic 7348 All-in-one (snd+modm+vdo+net)	$122
Elite PR-SET ML All-in-one	$115

Mouse

Aopen 3B PS/2	$6
Generic mouse/with wheel	$5/$8
Genius net mouse	$13
Logitech 3B PS/2 /Serial	$6
Logitech 3B PS/2	$14
Logitech 1st Mouse w/ Wheel	$17
Logitech Cordless MouseMan Plus	$call
Mitsumi 2B w Wheel	$11
MS Intelli mouse PS/2	$27
MS Cordless Mouse	$call
USB 3B Mouse	$11

Printer(some w/rebate)

Canon BJC 5100	$call
Canon BJC 1000/2000(after rebate)	$74/$103
Canon LTP 1760	$call
Epson 440/Epson 660(after rebate)	$87/$125
Epson Photo 700/740	$call
Epson 850/900	$call
Epson LQ-870/570	$610/$473
Epson LQ-570/LX-300	$347/$245
HP 1100 Laser	$588
HP 895 C/5PLaser	$call
Brother/ Lexmark/Okidata	$check

Scanner

Acer/UMAX/HP /Epson/Mustek/IBM/AGFA	$check

Sound Card

Acer AW37 ISA	$19
CREATIVE Ensoniq	$36
Diamond mx-300 PCI	$call
SoundBlaster 128 PCI	$48
SB Live PCI retail	$call
SB Live VALUE PCI	$74
Aureal 3D PCI	[illegible]

Video Card (PCI)

S3 TRIO 8MB	$68
SIS 4MB	$38

Video Card (AGP)

Asus V3800 TNT2 32MB AGP	$133
Asus V6800 GeForce256 32MB AGP	$385
ATI Xpert@98 8MB AGP	$67
ATI Xpert@128 16MB AGP	$110
ATI Xpert@2000 32MB AGP	$110
ATI All in Wonder@128 Pro 32MB	$386
ATI Rage 128 Fury Retail	[illegible]
ATI Rage Fury MAXX 64MB	[illegible]
Matrox G400 16MB/32MB	$180/$225
Generic RIVA TNT2 32MB	$127
Generic RIVA TNT2 16MB	[illegible]
Creative Labs Savage4 32MB	$130
Creative Labs GeForce Pro 32MB	$391
S3 Trio 4MB	[illegible]
Voodoo 3000/3500 AGP	$129/$176

Add On TV Tuner & Conference

ATI TV Tuner ISA (For ATI only)/Aver TV Tu...	$call
Intel create and share USB	$call
Logitech webcam usb/kodak dvc-323 USB	$call

Networking

Acer/Surecom/Generic Com. PCI Network Card	$18
Acer/Surecom/Generic Com. ISA Network Card	$18
Dlink 10/100Mbps PCI Network Card	$26
Generic 10/100Mbps PCI Network Card	$23
Dlink DE-660CT PCMCIA 10Mbps NIC	$90
Dlink Network Kit	$call
USB Network Adapter	$call
4 port/8-port Hub	$45/$call
USB Hub	$call

Speaker

Altec Lansing ADA305/3D-108-400W	$185/$call
Cambridge Sound	$check
Generic 140W/320	$18/$26
GNT 5000a/7000 w/Subwoof	$66/$96
Logitech soundman extreme	$call
Yamaha M15/Zenon ZN-6800	$75/$95

Others

Promise UDMA66 IDE Controller Card	$call
UDMA66 IDE Cable	$8
UDMA66 IDE Mobile Rack	$call
ASUS SMART Cooling Fan	$6
586 CPU Ball Bearing Cooling Fan	$8
Headphone w/Mic/ Mic w/Stand	$4/$6
Adaptor for socket 370 to slot1(celeron)	[illegible]$21
1.44MB Floppy Disk/Zip Disk	$4/$13
Printer Card ISA (EPP ECP)/Cables	$16
Blank CD/Blank CD extra/Rewritable CD	$1.3/$4/$10
Floppy1.44MB Disk box(holder)	$5

Customer may use coupon for some items, please check with our salesman

Year 2000 Daily Special

The following items and price only valid on June 6, 2000 (Today).
Check WEB for price and items chang everyday (Daily Special Section)

Epson Stylus 440	[illegible]
Canon BJC-1000SE	[illegible]
Canon BJC-5100	[illegible]
AOC 19"	[illegible]
Samsung 753DF	[illegible]
Viewsonic EF70	[illegible]
NEC FE700	[illegible]
ABIT BE6 Motherboard	[illegible]
USR 56K PCI (Hardware)	[illegible]
Quantum 3.2GB	[illegible]
Western Digital 1.6GB	[illegible]

Special Price (system or larger sales) + coupons

MS WIN98 SE/WIN2000 CD	$3 Off
CANON 1000/2000	$3 Off
HP8100/HP8210+	$6 Off
Samsung 17"	$5 Off
DAYTEK 15"	$5 Off
DAYTEK 17"	$5 Off
OPTIQUEST	$5 Off
ANY EPSON PRINTER	$3 Off
ANY SCANNER	$5 Off
CANNON 4400	$3 Off
SPEAKER 140W	$1 Off
SPEAKER 320W	$2 Off
ANY KEYBOARD	$1 Off
ANY MOUSE	$1 Off
ANY MICROPHONE/JOYSTICK	$1 Off

See WEBSITE For current Price
Price on AD announced on 6th June 2000 and valid up to 15th June 2000 only

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AMK 2x60	$39 99
Vantec 5031I	$24 99
Athlon/ Pentium II	
Alpha 7125	$69 99
Globalwin VOS32	$39 99
Globalwin FLK32	$24 99
PPGA/ 370	
Alpha 6035MFC	$39 99
Alpha PEP66T	$49 99
Globalwin FDP32	$74 99
Globalwin FEP32	$74 99
Hard Drive Coolers	
Just cooler TT 900	$34 99
Vantec HD 1	$19 99
Ultimate HD cooler	$29 99
Globalwin I Storm II	$39 99
Video coolers	
JustCooler two slot fan	$19 99
Video ram Heatsinks	$7 99 ea
Globalwin FAC420	$14 99
Globalwin CAF12	$24 99
Globalwin CBF32	$74 99

Price and configurations subject to change

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[illegible]
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[illegible] www.thetechzone.com

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AMK 0334 250w	$109 99
OCD 0331 300w	$149 99
AMK 3333 250	$129 99
OCD 33333-300	$149 99
Upgrade to 300 watt +	$20
Upgrade to 450 watt +	$115
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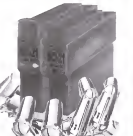

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Put yourself in command

Continued from page 92

lection or from those you've downloaded—choose Insert, Picture, then Clip Art. Alternately, choose From File to access an image that is on your hard disk. Add one image for each worksheet you want linked to your command centre. Open and size the images and arrange them in your worksheet.

To improve the look of the images, remove any borders and make them transparent if possible (this will depend of the format they are in). To do this, select each image in turn, right-click and select Format Picture. Select the Colors and Lines tab, set Fill Color to No Fill and Line Color to No Line. Click OK to confirm these settings. Options will be greyed out if they aren't available for a particular image type.

At this stage you must save your file into the directory that you plan to store it in. This must be done prior to creating hyperlinks to other worksheets, so choose File, then Save. At the same time, check to make sure all the files you want to to open from your command centre are in the folder(s) in which you intend them to stay. If they aren't, move them into the correct folder(s) before continuing.

Making the links

Now you're ready to link each image to a workbook or another type of file. To do this, select each image in turn and choose Insert then Hyperlink. In Excel 97, click in the Link To File Or URL box and click Browse. Locate the file you want to open every time you click this image and click OK. Should you want to link to a named location in that file—a bookmark in a Word document or a named range in an Excel workbook, for example—click in the Named Location In File area and click Browse. You'll see a small box appear with the options you can select from that are available in the file you have chosen to link to—this can be different for each file you choose. Make your selection from the list and click OK.

In Excel 2000 the Hyperlink dialogue has undergone a makeover from the one used in Excel 97. From the options in the Link To list, click the Existing File Or Web Page button, then click the File button to browse for a file on your hard drive. Select the file and click OK. Click the Bookmark button, select the place in the file you want to be positioned at when the file opens, then click OK. You can also set a ScreenTip for the link so a text description of the file will appear beside the cursor when you hold your mouse over the image. To do this, click the ScreenTip button, type the ScreenTip text describing the file you're linking to the image, then click OK. Click OK again to return to your worksheet.

Once you've linked the first image to the file it will open, save your file and test the link by first clicking away from the image once so it is not selected. Now hold your mouse pointer over the image and wait until it turns into a pointing hand. Click the image once and wait while the hyperlinked file opens. If you selected a bookmark or named range, you'll be positioned in that place in the file when it opens.

You will notice that the Web toolbar is visible on the screen so you can simply click the Back button to return to your command centre file. Or click the Window menu and choose the command centre file name from the list of open files. You can now repeat this process of creating and testing the hyperlinks for each image on your worksheet.

When all the images are hyperlinked you may also want to add text links—as you would on a Web site. Adding text links means you don't have to rely on the ScreenTips to remind you which files images are linked to, and that other people can easily understand and use your command centre.

To add a text link, click the cell to type the text in. You'll find you won't be able to see the cells as there are no gridlines, so approximate the right place, click there and type your text. To create a hyperlink anchored to this text, click in the cell containing the text to select it and choose Insert, then Hyperlink. Repeat the process you used to link the images to files, select the desired files and the place in the file that you want to be taken to when the file opens. You'll repeat this for every text link you want to create on your command centre. ➤

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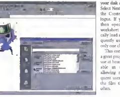

The command centre uses simple hyperlinks to connect the images and text to the files they open

When you hyperlink text you'll see that the format of the text changes to Excel's special hyperlink format and if you had formatted your text some other way, this formatting has been lost. Excel uses Styles in much the same way they are used in word processing software. Hyperlinks are always formatted using the built in Excel Hyperlink style. If you prefer some other format, you can change the appearance of hyperlinks by altering the style itself. To do this, choose Format, Style then from the Style Name drop-down list, choose Hyperlink, click Modify, and click the Font tab. Make your choices from the dialogue and under Underlining, choose None if you prefer that your hyperlinks not be underlined. Click OK twice to confirm your choices and return to your workbook.

Final touches

If you wish you can protect this sheet and the workbook itself so they cannot be altered by accident. This is a good idea if you're sharing the file with novice users. To do this, choose Tools Protection then Protect Sheet. Select all the checkboxes (don't set the password unless you really need one) and click OK. Now choose Tools, Protection, Protect Workbook, enable both the Structure and Windows checkboxes and click OK. Save your file again.

To set this file so it will open whenever Excel is loaded simply place a shortcut to the file in Excel's Xlstart folder. To do this, open Windows Explorer, locate the Xlstart folder which is probably at C:\Program Files\Microsoft Office\Office\XLStart. Right click inside the folder and select New, then Shortcut. Either type the filename and path of your command centre file in the Command Line area or, better still choose Browse and from the Files As Type list, select All Files. Now locate and select the command centre file on your disk and click Open. Select Next, then Finish in the Create Shortcut dialogue. If you close Excel then open it again the worksheet will automatically load and all your frequently used files will be only one click away.

This command centre is a great project to build and use at home and is invaluable in the workplace allowing new and infrequent users to easily find the files they need most often.

Lotus 1-2-3

You can create a similar command centre using Lotus 1 2 3 if you follow the basic concepts used for the Excel version using the relevant Lotus commands. To insert an image, choose File, Open from the Files As Type drop down list select All Files (*) and locate the image you want to use from your hard drive. Choose the Combine With Current Workbook checkbox choose Combine then click in the worksheet where the top left corner of the image should appear. You can also add an image to a worksheet by copying it to the Clipboard and pasting it into your worksheet.

To remove the border from an image select it, right-click, then choose Drawing Properties. Choose the Color, Pattern And Line Style tab, then set the Border Line style to None.

Create hyperlinks to text or images by selecting the cell or image and clicking Create, then Hyperlink. From the Action drop-down list choose Go To Another File, click Browse, locate the file to link to, click Open, then OK.

Select the entire worksheet by clicking the letter A in the top left corner and choosing Sheet, Sheet Properties, then the Color Pattern And Line Style tab. Choose a Background colour, then select the View tab deselect the Grid lines and Sheet frame checkboxes then select View, Set View Preferences, then the View tab. Deselect the checkboxes for Sheet Tabs and Scroll Bars then select OK.

Choose File User Setup, 1-2-3 Preferences, File Locations and make a note of the folder listed in the Automatically Opened files area. This is the folder you should save the file into so it will open automatically whenever you load Lotus. ❏

Helen Bradley specializes in writing hands on tutorials. Her columns appear regularly in a number of publications in Australia, the U.K., and the U.S. Contact Helen at helen@helenbradley.com

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Home networking: Part 1

Continued from page 93

bers. A, B and C. In this column we'll only concentrate on Class C, the most popular class for small networks (any good network book will explain the difference in TCP/IP network classes)

The Internet standards bodies have reserved 192.168 0-255 for private use That means that for your home network, you can choose any range from 192 168 0 to 192 168 255 That's 256 choices (0-255) Within each of these networks, you can have 256 devices attached. Actually it's only 256 choices because the first and last number of the range are almost always reserved.

If you've not set up a home network before then just follow this recipe: your home network is going to be 192 168 0.0 255 The address 192.168 0 0 is reserved as your "network" address and 192 168.0 255 is reserved as your "broadcast" address. By convention, you should also reserve 192.168 0.1 as your gateway address. Make this the address of your Linux box, or the Linux box you intend to use to connect to the Internet if you have more than one Linux machine.

In a Class C network, the subnet mask is 255 255.255 0 I'm going to skip the mathematics involved with subnet masking. You can look it up in a networking book if you are interested (and it really is quite interesting, if you enjoy knowing how things work)

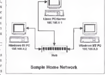
So, let's say your home network consists of a Linux box, a Windows 95 PC and a Windows NT workstation Make Linux 192 168 0 1 Assign Windows 95 192 168.0.2 and Windows NT 192 168.0 3 All have the subnet mask 255 255.255 0 (You can do that with Macs too, but I don't have a Mac, so can't offer details)

For Red Hat Linux, you can enter the IP number and subnet mask via the X Window Control Panel, by Linuxconf, or by the command line program netconfig. (Once you get to know networking better, you can do this by hand editing the networking scripts directly)

For Windows, use Control Panel, Networking to set the fixed IP Address and subnet mask. You should give your network a bogus domain name—something that would never be recognized as valid on the Internet. For example, I call my private domain "mynet.all" and my boxes are given names such as "darwin.mynet.all", "wallace.mynet all", "austen.mynet.all" and "gamer.mynet.all"

We'll assume at this point that you're not yet on the Internet with your entire network, so leave DNS server blank. We'll also assume that you also don't have a DHCP (dynamic host configuration protocol) server—at least not yet.

Once you've filled in these values a few times, it becomes second nature.



Sample Home Network

Fixed vs. Dynamic IP

After you've gained some experience with home networking, you may want to experiment with DHCP, or the automatic assigning of IP numbers to your non Linux systems Linux comes with an excellent DHCP server that eliminates the need to hard code IP addresses onto all the workstations.

For a home network, hard coding IP addresses is really not a big deal, but having DHCP can be very beneficial if you have a portable PC from work that you want to plug into your home network. It makes your home network very versatile, particularly if you plan to connect your home network to the Internet.

Connecting it all together

Once you have all the hardware connected and all the IP addresses entered, your home network should look similar to the diagram Now for the magic moment. Reboot all your systems so that the networking information is active Now log into your Linux box. If your Windows PC has been assigned 192.168 0 2, type the following from Linux:

```
$ ping 192.168.0.2
```

Perhaps no thrill in computing is as great as the one you get when you first see the machines on your home network successfully ping one another

Now go to your Windows PC, open a command prompt and type

```
C:\>ping 192.168.0.1
```

Congratulations! You have connectivity

Unless you want to create a DNS (domain name service) on your Linux box to study DNS (a perfectly fine goal), you can keep name resolution simple by adding host tables to the workstations on your network.

In Linux, the host table is /etc/hosts If your PC is named "charlie" and your Linux machine is named "parker", edit /etc/hosts and add the following

```
192.168.0.1  parker  parker.mynet.all
192.168.0.2  charlie charlie.mynet.all
```

If you have more than two machines, add an entry in the hosts table for each workstation on your network.

For Windows 95 or 98, add an identically configured text file called HOSTS in your windows\system directory On NT add it to \winnt\system32\etc.

Once you have this in place, you can ping any address machines by name The hosts table converts names back to IP addresses

Continued on page 108

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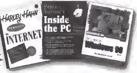

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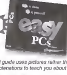

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Love bug a wake-up call

Continued from page 99

increasingly dangerous because they require no state sponsorship and use commercially available equipment and facilities.

The love bug is a good example this. Reports suggest that the virus was the work of a student in the Philippines and was based on a rejected thesis project for his computer class. The program was created to steal passwords and Internet access. The suspect has denied that he deliberately sent the virus although he has suggested that the virus may have been released "accidentally."

And a diligent search on the Internet will reveal many other programs that can be downloaded and used to attack systems.

While the Senate report would only say there was currently no evidence that Canadian systems had suffered a major cyber attack, it did suggest that had been several "minor incidents" but it did not elaborate further.

Because of the growing cyber terrorism threat several levels of Canada's federal and provincial governments have begun to actively look at ways to defend Canada's critical infrastructure and computer systems.

"What we have done is develop an operational program to investigate this issue and to identify any threat to Canada's critical information infrastructure," CSIS's Comeau says. "We look at three elements: the actor or person behind the attack—it has to be a foreign government or someone acting on the behest of a foreign government; the second is a terrorist [one] who belongs to a recognizable group; the third would be politically motivated extremists."

Comeau says his division is not concerned with groups that use the Internet to disseminate propaganda or to recruit members. Such activities would fall under the mandate of other branches of CSIS.

"What we look at is an attack against something," Comeau says. "We are here to protect Canada's critical infrastructure from attack. If somebody is attacking a federal computer system for sabotage, to remove information or to disrupt it, that would be something that would trigger interest from our unit."

One of the issues that agencies like CSIS have to deal with is identifying exactly which parts of Canada's information technology infrastructure are critical or sensitive and, therefore, in need of close monitoring. To address this the federal government recently created the Critical Infrastructure Protection Taskforce whose task is to not only identify critical systems, but to formulate a coordinated plan of action for the defence of those systems. The taskforce grew out of the Y2K taskforce that investigated the readiness of Canada's computing infrastructure for the year 2000 turnover. In 1999 the concern was whether critical infrastructures might be disrupted by the date change, and if so, what the social and economic repercussions would be.

"Critical infrastructure is in our view both physical and cyber based infrastructures whose disruption or destruction would impact on the health, safety or economic well being of Canadians and have a negative effect on the workings of the government," says James Harlick, executive director of the Critical Infrastructure Protection Taskforce in Ottawa.

Started in April the taskforce should present its first report this fall.

Paul Teeple, the officer in charge of the technical security branch at the Royal Canadian Mounted Police (RCMP) in Ottawa, says his group has not come across any incidents of an organized attack against a critical system that was perpetrated by a known extremist group or foreign government. While he suggests the potential for such an attack exists, he says attacks from organized criminal groups that have discovered the power of the Internet to both make money and cause harm are more likely.

"There are access attempts that have come from various countries," says Teeple. "We have had some that have come from Russia and these may be individuals as opposed to governments. And just about anywhere in the world we have had access attempts."

Another growing area of concern for security experts is industrial espionage.

Industrial espionage

Today information is just as valuable a commodity for companies as the physical goods or the services they provide to customers. Getting access to sensitive corporate information can sometimes mean the difference between losing a major bid on a contract or gaining a foothold in an emerging market.

Sometimes this kind of espionage is not simply one company spying on another. It may also involve a country using its intelligence resources to penetrate a foreign business's systems in order to get information that their domestic companies can use to their advantage.

Recently the European Parliament was presented with a study, *Interception Capabilities 2000*, that suggests the U.S. government has used its Echelon surveillance project, and possibly other security agencies, to gather critical business information on European companies.

Continued on page 108

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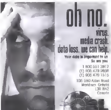
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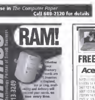
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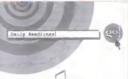

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Love bug a wake-up call

Continued from page 103

This information was then passed on and used by U.S. companies looking to secure important business contracts against local competitors.

As an example, the study cites a "well informed 1995 press report" that the, "NSA [U.S National Security Agency] lifted all the faxes and phone calls between the European consortium Airbus, the Saudi national airline and the Saudi government. The agency found that Airbus agents were offering bribes to a Saudi official. It passed the information to U.S officials pressing the bid for Boeing Co. and McDonnell Douglas Corp., which triumphed last year in the [US]$6-billion competition."

The study also suggests that information gathered by U.S. intelligence agencies was used during the 1995 trade negotiations on the import of Japanese luxury cars, French participation in the General Agreement on Tariffs and Trade (GATT) negotiations in 1993, and the Asian-Pacific Economic Conference (APEC) in 1997.

But if private sector companies are now facing ever greater threats to their systems—either by those looking to either disrupt them or to penetrate them to gain business advantages—they have been slow to put security measure into place.

Fred Cotton, president and chief executive officer of Fred Cotton and Associates in Sacramento, Calif., says many companies often refuse to publicize or report such attacks because they are bad for business. They prefer to deal with the problem quietly.

Dan McLean, research manager for managed network services with the Toronto-based International Data Corp. (Canada) Ltd., says many large companies have reported being hacked in the last 12 months, sometimes by people looking for sensitive corporate information.

"We did not drill down into specifics, [but] it does point to the fact that there are intrusions that are happening and on a fairly large scale," McLean says.

In order to combat this, many companies are now starting to develop comprehensive security procedures to protect against attacks from both the outside and inside.

Architectural problem?

There is some argument that what makes cyber terrorism possible is not simply the individuals, groups or foreign intelligence agencies bent on doing harm, it's the computing architecture itself, which is inherently vulnerable to attack.

Austin, Tex.-based, intelligence consulting firm, Stratfor.com (http://www.Stratfor.com/), points out in an analysis on its Web site that the PCs of today were never meant to be connected to other machines and the Internet. They were meant to be used by themselves and by a single individual, so security was never a priority. Once linked, PCs and the networks that soon sprang up around them, were open to attacks that would be hard to trace and stop. Contributing to this vulnerability is the fact that the underlying architecture of the system is not transparent to anyone. Even experts can be unclear about what exactly is going on under the hood. This makes it hard to find all the holes and breaches that exist in a network, and close them down.

Terrorists, extremist groups and criminals have now come to understand what many 15-year-old hackers know too well: it is surprisingly easy to write a simple program or get into a system and do a lot of damage because of the way operating systems and networks are constructed today.

"A teenage kid can knock out hundreds of corporate systems because the foundation of modern computing, the operating system, has been in rapid, forced development since the success of MS-DOS. It was designed for one user who would treat it right. Security requires a complete re-engineering of the operating system," advises Stratfor.com.

As the analysts at Stratfor.com are quick to emphasize, a rogue state does not need to launch a nuclear attack in order to inflict damage onto another country. All it needs to do is launch a well-placed virus and down come the systems.

"But how do we retaliate against a virus attack? We depend on computers. They don't." ❑

Home networking: Part 1

Continued from page 101

```
$ ping charlie
```

That's a great start. Once the hardware infrastructure is in place and the IP numbers are assigned, you're ready for some fun. In the next installment, we'll take a look at Samba, a Linux networking service that makes Linux look like an NT to your Windows workstations. Samba can be used for file sharing and printer sharing. ❑

Gene Wilburn (gwilburn@home.com) is a Toronto-based IT manager, musician and writer who operates a small farm of Linux servers. Back issues of this series are available on his Web site at http://www.northernjourney.com

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TEENS IN VANCOUVER USER GROUP For teens below the age of 18 interested in being computer related projects regularly. WWW programming, games: anything! The main goal is to meet computer knowledge and to make friends. If there are any homeschoolers interested, that would be great. If interested, please call Brian Mak at 808-2636.

VANCOUVER AUTOCAD USERS SOCIETY 1st Wed. of the month 7:30 p.m. B C I T Bby. Campus Bldg SW5 Room 1850. Contact: Frank Zander (604) 980-8083

VANCOUVER DELPHI DEVELOPERS ASSOCIATION meets once a month at the InfoCan Management Head Office, on West 8th Ave. 1 block east of Oak St. The meeting is usually on the second or third week of the month. Please check website for details: http://www.infocan.com/VDDA.htm. The purpose of the group is to provide a common and regular forum for Delphi developers to get together and discuss Delphi related issues. Admission is free and all notices are sent via e-mail. To have your name added to our distribution list, please send your complete contact information to vdda@infocan.com, Fax: 604 736-5666 contact Maggie Li (administrator) at tel 604 736 5808

VANCOUVER FOXPRO USER GROUP www.pbsaaa.org meeting time and location info Kimberley at bsoong@planetbox.com or Joy at joyton@fsoftware.com.

VANCOUVER GEOGRAPHIC INFORMATION SYSTEMS USER GROUP Meetings are held on the 1st Wednesday of each month September through May at B C I T. Town Square Room 'C' at 7 30pm. Contact Dwight at 946-1518 for information

VANCOUVER NETWARE USERS GROUP (VNUG) is an official user group recognized by the Netware Users International board and supported, in part, by Novell. Meetings are held on the third Wednesday of every month at 7 pm at PBSC Computer Training Centre Hong Kong Bank building 900 555 West Georgia Street. All aspects of the networking environment are discussed and presented with emphasis on the Netware network operating system. The workshop begins at 4:00p m. buffet dinner at 6:00pm. at 7:00pm is a Q&A session followed by a presentation ending at around 8:30pm. Member, non-member and student pricing applies to the workshop and/or dinner-presentation. For further information or meeting topic announcements call our issue mail at 689 VNUG (689-8684) or Fax us at 683-8758

VANCOUVER PC USERS SOCIETY (VPCUS), 2nd Thursday, 7pm at the Pacific Space Centre (the Vancouver Planetarium) members free and guests $5 admission. Excellent Q&A session & feature presentation. Our mission is to network and inform our members and the ➤

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THE VANCOUVER SQL Server Users Group is an independent non-profit organization dedicated to providing an information exchange venue for Microsoft SQL Server. Launching its bi-monthly meetings starting Thursday January 7 1999 from 5:30pm to 8:30pm. For more information visit our web site at www.vansq.org. Phone: 899-9434

VPCUG CLARION TOPSPEED SIG — Clarion is a full featured industrial strength DOS & Windows application development tool. Its superior 4th level language and incredible templates produce completely robust and tight EXE's that run fast and are royalty free. This lively SIG attracts a range of participants from seasoned professional programmers to new users and the curious. Meets the 1st Wednesday of every month at Metrotown. Contact John Gaika 736-7782.

VPCUG DBUG (Data Base Users Group) Emphasis is on solving problems of data management with special reference to Paradox. Bring a blank 3.5 inch disk to pick up goodies from the meeting. Meetings for the next few months will be informal and held at a local pub. Contact Brad Freese 937 7222, or email brad: Freese@[illegible]

VPCUG Educational Seminars — Members $5. Non-members $15. Various topics, times and dates. Contact Dennis Ellwood 737 8678.

VPCUG HTML AUTHORING SIG This SIG is a good place to come for informal discussions with other HTML developers or to get others on building business and personal Web pages. Topics include graphics and HTML, plug-ins, the browser wars, Java/connectivity issues and marketing on the Internet. Both novice and advanced HTML authors are welcome. We meet on the 2nd Tuesday of each month. Contact Brenda Delaney bdelaney@interchange.ubc.ca or Virginia Green virginia@interchange.ubc.ca for meeting info and to get our email list.

VPCUG INTERNET SIG New to the info highway? Get to know the Internet and the Web with an experienced guide. Contact Jim Thompson for details 685-6545.

VPCUG WordPerfect SIG-Participants share tips and troubleshooting for all versions of WordPerfect for Windows and DOS. Contact Holly Rivers at 731-0039 or email: hollyr@idowco.com

VPCUG NETWORKING SIG This is the place if you are a network administrator and you need a break from beating your head against a wall, or what to ideas with people who actually care what you are talking about. Come and share tips, tricks and support ideas. Currently on hiatus; we're looking for volunteers interested in getting this SIG going again. Contact Brenda Delaney bdelaney@interchange.ubc.ca or fax 224 2143 for more information.

VANCOUVER LINUX USER GROUP A group of students, professionals and computer enthusiasts with a common interest in Linux, UNIX and Open Systems. Linux is a free, yet very powerful operating system for numerous computers of all types. Anyone interested is welcome to join VanLUG. For membership information, please visit the Linux in Vancouver Web Site (http://www.vancouver-webpages.com/vanlug/) or send messages to info@linux.bc.ca

VANCOUVER OS/2 USER GROUP Attended by OS/2 gurus and novices alike. The large and lively meeting is held on the first Wednesday of each month at the BC Tel Building, 3777 Kingsway, Burnaby and starts at 6:45 pm. Contact Jim Shewchuk 876 4793

WESTERN CANADA WEBOBJECTS USER GROUP The WCWOUG is a majority of business managers and software developers interested in exchanging ideas about building secure business-driven web sites using the best internet application development tools. Send e-mail to info@wcwoug.org or visit our web site at http://www.wcwoug.org for details.

TVVFSC Meeting 1 Sunday a month for LAN flight simulations in New Westminster and each other Sunday evening for Online simming. Details: http://www3.telus.net/franz/TVVFSC

CALENDAR

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BIG COMPUTER SWAP MEET Saturday August 12, 2000 from 11am to 4pm at the Croatian Cultural Center 3250 Commercial Drive Vancouver Admission is $7.00. For more info call (604)521-6304

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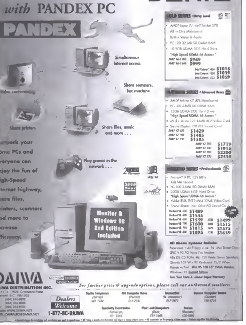
http://www.projectfullmoon.com/

Chicago historians get violent

—The goings on at the Web site of the Chicago Historical Society are anything but dull—unless you tend to nod off at the thought of a fatal bombing that changed a nation or a blood soaked relic from the Lincoln assassination. Two new online exhibits at the site take a close look at some violent American history. "The Dramas of Haymarket" an 1886 Chicago bombing which the historical society says tore the city apart and spawned a worldwide labour movement. The other exhibit, "Wet with Blood" examines relics related to the 1865 assassination of U.S. President Abe Lincoln.

http://www.[illegible]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The Eyes of the Web are upon you

When you're online, everybody wants to own a piece of you—and they have the technology to do it.

Information wants to be free This was the rallying cry of the cyberpunks who helped promote the public acceptance of the Internet in the early 1990s. The early Web heads helped build up an enthusiastically non proprietary, non commercial popular movement, which gave the critical mass of support that let the World Wide Web become truly worldwide However as the old saying goes, "Be careful what you wish for—you might get it."

The logical outcome of an open global information network is that information will be free Potentially, all kinds of information to anyone In some cases, the freedom inherent in digital media, to copy and share certain kinds of information, poses a huge threat to corporate and artistic control of intellectual property such as software and music. Millions of MP3 users react to this danger with a simple word. "Cool!"

However the same technology that enables access to the world library also poses a huge threat to personal privacy The downside of the wired world is that it makes it possible for Web users online movements, history, and personal writings to be recorded and analyzed automatically, in unprecedented detail, on a vast scale, for any conceivable purpose. And many of those purposes are potentially harmful to you.

Where everybody knows your name

The digital libertarians of the electronic frontier once envisioned the Web empowering infinite individual access to information and unlimited direct interaction between individuals and communities free from traditional government or corporate control. To varying degrees, that has come to pass

However, many other interested parties have jumped on the Internet as a wonderful tool for snooping on, manipulating, and sometimes harassing, defrauding, or impersonating Web users. With the aid of database technology, tens of millions of electronic dossiers on Web users are being continually created, updated shared, and used. In most cases this is being done without the consent or awareness of you and me, the people who are being watched

Some of these uses are fairly benign, such as Web site operators analyzing which parts of their sites are attracting the most traffic so they can focus on providing the most interesting content. Some are obviously malignant including collecting personal information to commit "identity theft," attempting to lure children into illegal activities, or cyber stalking.

As personal information on Web users becomes a commodity that is bought and sold, the biggest problem is that you have no control at all over what is done with your personal information, once it has been captured and put on the global market.

Who's watching you?

Even as corporations rage against online piracy, they are, at the same time, systematically collecting oceans of personal information on Web users They are trading, buying and selling that info with other corporations, governments and individuals for purposes ranging from advertising and selling, to "loyalty management" data, to screening potential and current employees *Fortune* 1000 companies aren't the only snoopers.

One of the biggest concerns about online privacy is that once personal information is captured digitally, the concept of "information wants to be free" means that anyone—literally anyone—may end up having access to it. No matter what a corporate Web site's privacy policy says, or what Canadian government officials claim about the security of government files, once information exists on a network, it is at constant and great risk of spreading beyond its original location, for purposes beyond its owner's control.

For instance, your Canadian census information, stored in government databases, is supposed to be confidential. However, the legislation governing the census includes an allowance for major political parties to have access to a large part of the data for electioneering purposes. The more agencies that have access to the information, the more likely it is to "leak." Privacy policies are just words. The pressure to use information which is known to exist overcomes privacy barriers. A Web site privacy policy can't prevent hackers who steal the information from misusing it and few Web sites are truly self sufficient their business partners, including advertising services, Internet service providers (ISPs), technology suppliers and others may have access to site user information, and are not bound by the site owner's privacy policy

Here's a partial list of those who are waiting to watch you when you when you go online

- **Information brokers and traders** These are companies that compile and sell information using database and Internet technologies For a fee you can get an astonishingly complete picture of most people's finances, work history families, and often even drivers licence numbers, Social Insurance Numbers, addresses and phone numbers.
- **Internet advertising services** Most famously DoubleClick, but also Engage, collect users personal information (DoubleClick has also bought household purchasing information on most U S families) to target ads specifically at the interests of identified Web users.
- **Web site operators.** Amazon.com is likewise being attacked for having quietly collected information on visitors to its site, which enabled it to get a very good idea of the political, social, and sexual orientations of its visitors
- **Spammers.** The bottom of the Internet advertising barrel is filled with entrepreneurs who collect masses of email addresses and bombard them with huge numbers of unsolicited email advertising.
- **Identity thieves:** Freelance or organized criminals collect the personal information required to impersonate the victim Traditionally, the preferred method was to steal the victim's purse or wallet, and use his or her credit cards and other documents to make purchases, or change identities.
- **Stalkers.** Disturbed or criminal individuals who pursue people they wish to dominate or harm, collecting information on them, sending harassing email, impersonating them, and in the case of pedophiles or obsessive fans or suitors, trying to meet the objects of their obsession.
- **Hackers/crackers:** Mostly young men who steal passwords and usernames, either by reading your email for interesting info, or by deception over the phone or email.
- **Governments and government agencies:** In some conspiracy theorists' minds, the biggest online threat to privacy In fact, U S. agencies, such as the National Security Agency quietly analyze most of the world's telecom traffic, but they are rarely interested in the ordinary citizen
- **ISPs** These companies have a keystroke-by keystroke record of where their subscribers have gone—which they are supposed to keep confidential.
- **Other Internet and telecom companies** Firms that run search engines, for example, can tie queries and sites visited to the IP (Internet Protocol) addresses they came from
- **Computer hardware and software vendors:** The practice of having a computer chip coded with an ID number, and the inclusion of automatic updating and reporting features in many programs have allowed companies such as Intel, Microsoft, Symantec and RealNetworks to identify what customers are doing with their products—in some cases without the customers' knowledge

What to do?

A short list of options to reduce your risk.

- Do a Web security audit of your PC using an online security test service such as ShieldsUp (http://grc.com/default.htm)
- Turn off your (Windows) PC's file and network sharing to prevent snoopers from coming onto your system Use a high security version of your browser (such as the 1,024-bit version of Outlook) and turn its security options to the highest levels.
- Maintain alternate free email addresses (such as can be had at no charge from Hotmail) Change the address if spam starts getting through
- Consider a personal Internet security software package such as Norton Internet Security 2000 which combines a personal computer firewall, parental content blocking, anti-virus software and options to block Java applets, cookies, ads, "Trojan" programs and other intrusions and nuisances.
- Consider testing or buying an anonymous Web surfing program, such as Anonymizer (http://www.anonymizer.com/), which prevents you from being traced by any of the snoopers listed earlier
- Never give personal information of any kind, and especially not your passwords, usernames, Social Insurance Number driver's licence number or credit or debit card numbers to anyone.
- Consider using an encryption program such as PrettyGoodProtection (http://www.pgp.com) to encrypt your email.
- Check your credit card and other monthly statements carefully for signs of unauthorized use and act quickly to cancel accounts and follow up any signs of identity theft.

The bottom line is: you are being watched, and you can determine your own level of security and comfort, depending on how much you stand to be harmed by loss of privacy online, and how much trouble you care to take to protect yourself ❑

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We have a solution for any type of connection requirement, from basic ISDN to advanced T1. With T1 you can handle large file attachments, transfer extensive video or image files, and even host a corporate Intranet.

Guaranteed access

With a dedicated line, your service is always available – 99.5% guaranteed or we will refund 25% of your monthly service fee.

Access on the road

When you're on the road, connect directly to the Internet through 60 local access numbers across Canada and hundreds of U.S. access points.

Reliable performance and exceptional support

AT&T Canada offers a high speed, high quality network with multiple Internet connections and monitoring around the clock. Depend on highly skilled technical support 24 hours a day, 7 days a week, plus access to a valuable on-line library.

Hardware included.

AT&T Canada supplies industry leading Cisco routers to suit your access needs.

We'll include the monthly business line* plus all necessary hardware and waive the set-up fee – up to $1,000

From as low as $295/month**

Based on a 5 year contract

AT&T Canada offers a full range of sophisticated, reliable Internet services for businesses of all sizes.

As one of the leading business-focussed global providers, we're committed to bringing you reliable leading edge solutions for all your local, long-distance and Internet needs.

1-877-430-7553

www.attcanada.ca/business/dedicate.html

AT&T Canada.

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